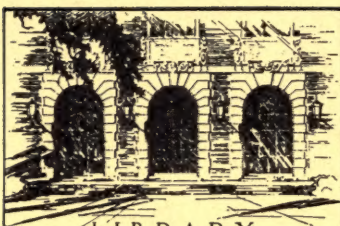




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# FLORA OF GUATEMALA

PAUL C. STANDLEY

AND

JULIAN A. STEYERMARK

FIELDIANA: BOTANY

VOLUME 24, PART I

*Published by*

CHICAGO NATURAL HISTORY MUSEUM

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# FLORA OF GUATEMALA





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PAUL C. STANDLEY

*Curator Emeritus of the Herbarium*

AND

JULIAN A. STEYERMARK

*Formerly Curator of the Herbarium*

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## CONTENTS

### Families Included in Part I

	PAGE		PAGE
Cycadaceae.....	11	Butomaceae.....	80
Podocarpaceae.....	20	Hydrocharitaceae.....	84
Araucariaceae.....	23	Triuridaceae.....	86
Cupressaceae.....	26	Cyperaceae.....	90
Pinaceae.....	36	Palmae.....	196
Taxodiaceae.....	56	Cyclanthaceae.....	299
Taxaceae.....	60	Araceae.....	304
Typhaceae.....	63	Lemnaceae.....	364
Pandanaceae.....	67	Mayacaceae.....	369
Potamogetonaceae.....	68	Xyridaceae.....	370
Najadaceae.....	73	Eriocaulaceae.....	374
Alismataceae.....	75	Bromeliaceae.....	380





# LIST OF ILLUSTRATIONS

## TEXT FIGURES

	PAGE
1. <i>Ceratozamia mexicana</i>	13
2. <i>Zamia Loddigesii</i>	17
3. <i>Zamia Tuerckheimii</i>	20
4. <i>Podocarpus oleifolius</i>	24
5. <i>Cupressus lusitanica</i>	29
6. <i>Juniperus Standleyi</i>	35
7. <i>Abies guatemalensis</i>	39
8. <i>Pinus Ayacahuite</i>	45
9. <i>Pinus caribaea</i>	47
10. <i>Pinus Montezumae</i>	49
11. <i>Pinus oocarpa</i>	52
12. <i>Pinus pseudostrobus</i>	54
13. <i>Pinus Strobus</i> var. <i>chiapensis</i>	56
14. <i>Taxodium mucronatum</i>	59
15. <i>Taxus globosa</i>	62
16. <i>Typha domingensis</i>	65
17. <i>Echinodorus grandiflorus</i>	77
18. <i>Sagittaria lancifolia</i>	81
19. <i>Hydrocleis Standleyi</i>	83
20. <i>Vallisneria americana</i>	87
21. <i>Sciaphila picta</i>	89
22. <i>Bulbostylis capillaris</i>	94
23. <i>Calyptracarya glomerulata</i>	99
24. <i>Carex polystachya</i>	105
25. <i>Cyperus rotundus</i>	137
26. <i>Dichromena Watsoni</i>	144
27. <i>Eleocharis elegans</i>	148
28. <i>Fimbristylis dichotoma</i>	158
29. <i>Hypolytrum Schraderianum</i>	164
30. <i>Kyllinga pumila</i>	167
31. <i>Rhynchospora tenuis</i>	177
32. <i>Scirpus cubensis</i> var. <i>gracilis</i>	182
33. <i>Scleria pterota</i>	191
34. <i>Uncinia hamata</i>	195
35. <i>Acrocomia mexicana</i>	203
36. <i>Asterogyne Martiana</i>	205
37. <i>Astrocaryum mexicanum</i>	207
38. <i>Bactris balanoidea</i>	210
39. <i>Bactris trichophylla</i>	212

	PAGE
40. <i>Calyptrogyne Donnell-Smithii</i> . . . . .	216
41. <i>Chamaedorea elegans</i> , <i>C. Ernesti-Augustii</i> , <i>C. Tepejilote</i> , <i>C. Arenbergiana</i> , <i>C. Rojasiana</i> , <i>C. geonomaeformis</i> , <i>C. oblongata</i> , <i>C. Pachecoana</i> . . . . .	226, 227
42. <i>Cryosophila argentea</i> . . . . .	257
43. <i>Desmoncus ferox</i> . . . . .	261
44. <i>Geonoma Seleri</i> . . . . .	270
45. <i>Manicaria saccifera</i> . . . . .	272
46. <i>Orbignya cohune</i> . . . . .	275
47. <i>Paurotis Wrightii</i> . . . . .	278
48. <i>Reinhardtia gracilis</i> . . . . .	282
49. <i>Sabal mexicana</i> . . . . .	288
50. <i>Scheelea Preussii</i> . . . . .	292
51. <i>Synechanthus fibrosus</i> . . . . .	296
52. <i>Thrinax parviflora</i> . . . . .	297
53. <i>Carludovica utilis</i> . . . . .	303
54. <i>Anthurium crassinervium</i> . . . . .	311
55. <i>Dieffenbachia seguina</i> . . . . .	327
56. <i>Monstera pertusa</i> . . . . .	333
57. <i>Montrichardia arborescens</i> . . . . .	336
58. <i>Philodendron Hoffmannii</i> . . . . .	343
59. <i>Pistia Stratiotes</i> . . . . .	348
60. <i>Spathiphyllum blandum</i> . . . . .	351
61. <i>Xanthosoma robustum</i> . . . . .	361
62. <i>Lemna paucicostata</i> , <i>L. p. var. membranacea</i> , <i>L. valdiviana</i> , <i>Wolffia Welwitschii</i> . . . . .	367
63. <i>Mayaca fluviatilis</i> . . . . .	370
64. <i>Xyris Jupicai</i> . . . . .	373
65. <i>Aechmea magdalenae</i> . . . . .	385
66. <i>Aechmea tillandsioides var. Kienastii</i> . . . . .	386
67. <i>Ananas comosus</i> . . . . .	388
68. <i>Androlepis Skinneri</i> . . . . .	390
69. <i>Billbergia viridiflora</i> . . . . .	392
70. <i>Bromelia Pinguin</i> , <i>B. sylvestris</i> , <i>B. Karatas</i> . . . . .	394
71. <i>Catopsis apicroides</i> . . . . .	397
72. <i>Catopsis cucullata</i> . . . . .	399
73. <i>Catopsis floribunda</i> . . . . .	400
74. <i>Catopsis Lundelliana</i> . . . . .	402
75. <i>Catopsis Morreniana</i> . . . . .	403
76. <i>Catopsis nitida</i> . . . . .	404
77. <i>Catopsis nutans</i> . . . . .	405
78. <i>Catopsis sessiliflora</i> . . . . .	407
79. <i>Catopsis Wawraea</i> . . . . .	409
80. <i>Greigia Steyermarkii</i> . . . . .	410
81. <i>Guzmania nicaraguensis</i> . . . . .	412
82. <i>Guzmania Scherzeriana var. guatemalensis</i> . . . . .	412
83. <i>Hechtia guatemalensis</i> . . . . .	414
84. <i>Hohenbergia guatemalensis</i> . . . . .	416
85. <i>Lindmania micrantha</i> . . . . .	418
86. <i>Pitcairnia flagellaris</i> . . . . .	421
87. <i>Pitcairnia heterophylla</i> . . . . .	423

	PAGE
88. <i>Pitcairnia imbricata</i> . . . . .	423
89. <i>Pitcairnia macrochlamys</i> . . . . .	425
90. <i>Pitcairnia punicea</i> . . . . .	426
91. <i>Pitcairnia Tuerckheimii</i> . . . . .	428
92. <i>Tillandsia anceps</i> . . . . .	435
93. <i>Tillandsia argentea</i> . . . . .	435
94. <i>Tillandsia Baileyi</i> . . . . .	437
95. <i>Tillandsia Balbisiana</i> . . . . .	438
96. <i>Tillandsia brachycaulos</i> . . . . .	438
97. <i>Tillandsia bulbosa</i> . . . . .	439
98. <i>Tillandsia Butzii</i> . . . . .	440
99. <i>Tillandsia caput-Medusae</i> . . . . .	442
100. <i>Tillandsia chlorophylla</i> . . . . .	442
101. <i>Tillandsia elongata</i> var. <i>subimbricata</i> . . . . .	445
102. <i>Tillandsia fasciculata</i> . . . . .	446
103. <i>Tillandsia festucoides</i> . . . . .	447
104. <i>Tillandsia grandis</i> . . . . .	449
105. <i>Tillandsia ionantha</i> . . . . .	451
106. <i>Tillandsia juncea</i> . . . . .	452
107. <i>Tillandsia lampropoda</i> . . . . .	453
108. <i>Tillandsia monadelphæ</i> . . . . .	455
109. <i>Tillandsia multicaulis</i> . . . . .	456
110. <i>Tillandsia polita</i> . . . . .	457
111. <i>Tillandsia ponderosa</i> . . . . .	459
112. <i>Tillandsia pruinosa</i> . . . . .	460
113. <i>Tillandsia punctulata</i> . . . . .	461
114. <i>Tillandsia recurvata</i> . . . . .	462
115. <i>Tillandsia Rothschuhiana</i> . . . . .	463
116. <i>Tillandsia Schiedeana</i> . . . . .	464
117. <i>Tillandsia Standleyi</i> . . . . .	466
118. <i>Tillandsia usneoides</i> . . . . .	468
119. <i>Vriesia heliconioides</i> . . . . .	472
120. <i>Vriesia montana</i> . . . . .	473
121. <i>Vriesia pectinata</i> . . . . .	475



# Flora of Guatemala

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## PLAN OF THE FLORA

This *Flora of Guatemala* is intended to list all phanerogamic plants growing naturally in Guatemala and British Honduras. The latter country has been included, since on both geographic and botanical grounds it is essentially part of Guatemala. Because British Honduras was covered by a rather recent publication, *Forests and flora of British Honduras* by Samuel J. Record and Paul C. Standley (1936), its plant geography is not discussed in the present *Flora*, and the authors have not collected there.

Besides the native and naturalized plants, there have been included in this *Flora* the common cultivated plants of Guatemala, whether of economic or ornamental value. These plants are mostly the same ones to be observed in cultivation in all other Central American countries and in tropical America generally. Such plants are more important to Guatemalan people than species of forests and meadows, and since there is no generally available publication treating the cultivated plants of tropical America, the information given here should be of service to them. Moreover, intelligent and curious strangers visiting the country, especially those without previous tropical experience, are likely to be just as much interested in cultivated plants as wild ones, and will desire information regarding them. The agriculture of Central America and especially of Guatemala is a subject well deserving detailed study. Some attention has been given in recent years to such crops as corn and beans, but a great deal of time could be spent profitably in investigating other economic plants, both cultivated and wild ones.

All the work of preparing the *Flora* has been done at Chicago Natural History Museum, and is based primarily upon recent col-



lections obtained by four botanical expeditions dispatched to Guatemala by the Museum. These have assembled some 54,000 collections of plants from almost every part of Guatemala. Besides our own collections, we have studied series of the basic and historical ones distributed by Captain John Donnell Smith, whose collections comprised a large percentage of the many new species described from Guatemala. We have used also a set of the recent but highly important collections made by Dr. A. F. Skutch, and have examined photographs or fragmentary specimens of types of many species described from the earlier collections made in Guatemala. Some of these are no longer extant, having been consumed by flames that destroyed the Berlin Herbarium in March of 1943.

If one will examine the catalogue of collectors in this volume, it will be found that the amount of earlier botanical exploration in Guatemala, aside from the collections just mentioned, was singularly small, especially when one considers the high reputation of the Guatemalan flora. Few of the collections besides those mentioned were as large as 300 numbers. Most of them were made in selected areas, easy of access or else attractive because of special comfortable conditions existing there (often a *finca* owned by some immigrant from the United States or Germany), or because of special groups of plants that it was decided to study in some particular spot where they were known to occur.

The collections made by Heyde and Lux and distributed by Captain Smith were assembled at a wide range of localities, as were those of Dr. Eduard Seler and his wife, who were visiting archeological sites, and the series obtained by Dr. Skutch, who was interested primarily in birds. Karl T. Hartweg had the high privilege of being almost the first collector to visit Guatemala. He worked in several widely separated but easily accessible localities, but the plants he described, although highly important historically, were not numerous. The rest of the collections, at least those of collectors from the United States, were made principally along the railroad between Puerto Barrios and Guatemala, on Volcán de Agua, or where lodging was most comfortable—on the coffee *fincas* of Alta Verapaz.

The collections studied we believe to be adequate for preparation of a flora. We have borrowed from the United States National Museum, Gray Herbarium, and the University of Michigan a few types and critical specimens necessary to establish matters of taxonomy, and to the curators who courteously lent this material we are greatly obliged.

It would seem that there are now reported most of the species that could be expected in Guatemala, practically all those found both north and south of that country, and the great majority of the Mexican species that could be expected to extend so far southward. However, work upon the Guatemalan flora has shown that plants of Mexico appear in Guatemalan localities where they are least expected, and it is not believed that their numbers have been exhausted. The borders of Guatemala have been fairly well explored, and for that reason intruding species from the north and south are less likely to be found. The Guatemalan flora as now compiled includes almost every species known from El Salvador and Honduras, so that many additions from that direction can not be anticipated.

There are certain parts of Guatemala where some additions can be found, without any doubt. Little is known of northern Petén, but in the parts of Mexico north of the Guatemalan border, themselves imperfectly known, there are few known species that fail to reach Guatemala. The areas of Guatemala where additions are most likely to appear are northern Huehuetenango and Quiché, where a good number of new species will be found, the mountains of Baja Verapaz, and the Cockscomb Mountains along the boundary between Guatemala and British Honduras. The southeastern portion of Jutiapa has not been explored, but it is improbable that many additions will be found there. It is rather strange, but explainable, that the main portion of Baja Verapaz still remains unvisited or at least the plants have not been collected by a botanist. The most profitable region remaining for botanical collecting we believe to be northern Quiché and Huehuetenango, and some surprises are confidently to be expected there. We believe that the present enumeration contains the vast majority of plants native in Guatemala, and it will be a surprise if the number is increased through later exploration by 10 per cent.

The general form in which data of the systematic portion of the *Flora* are printed will be, as a rule, sufficiently obvious. Generally in the synonymy only the essential names are listed: the name-bringing synonym, if any, and synonymous names that have been used for Guatemalan plants or recently for those of Central America. There have been included all names known to have been based on Guatemalan material, and under each of these the type is cited. Free citation has been made also of synonymous names based on material from Central American countries other than Guatemala or from nearby portions of Mexico, especially when such names have not been referred previously to synonymy. An attempt has been made

to account for all names that have been reported from Guatemala, in either the synonymy or remarks after the formal description of the species.

The names of authorities for species names have been abbreviated according to ordinary usage, except when the names are short. Authorities for the generic names are written in full, except in the case of "L." (Linnaeus or Linné) and "HBK." (Humboldt, Bonpland, and Kunth). The abbreviations for authors' names often mystify beginners in botanical work, and we have not supplied a list of their explanations, such as sometimes appears in a *Flora*. However, most of such abbreviated names will be found written in their full form after the name of a genus in some part of this *Flora*.

Under each genus or family there have been cited the most useful monographic accounts of the group, when such works exist. Some older monographs no longer of practical value have been omitted, although the synonymy of the species often will give a clue to them.

We have given all accessible vernacular names used in Guatemala that we consider reasonably authentic. Others that have come to our attention have been omitted because of doubt regarding their form or application, often because of obviously erroneous transcription that it was impossible to correct. Erroneous names do more harm than good, and in general they should not be collected by persons without a fairly good knowledge of Spanish as it is spoken and written in America, not in textbooks. In gathering vernacular names they should be checked with two or more persons if at all possible. An even better method is to have them written down by the informant, if he can write. His spelling may be bad, but at least he is likely to represent the sound of the word. Especially with Indian names it is easy for a person to misunderstand the sound of a word. Even educated Latin people sometimes are unable to decide whether the sound in a new word is, for example, "r" or "rr."

We have collected most of the vernacular names. Others have been taken from labels of other collectors, and some from publications whose accuracy we trust. A large number of names we have cited are from lists furnished by Don José Ignacio Aguilar, formerly Director of the Finca Nacional La Aurora, who has given much attention to the Guatemalan flora. We are indebted to Professor Ulises Rojas, formerly Director of the Jardín Botánico de Guatemala, who has given help with vernacular names and economic data. The vernacular names entered here doubtless include some mistakes, even after the best of care, and this is particularly probable in case of non-Spanish terms.



There is much more to be done in the field of Guatemalan vernacular names. In published lists we have seen many plant names whose identity it is impossible to guess. The value of a particular vernacular name varies usually in proportion to the importance of the plant. If the plant is one of which some definite use is made, or a showy and conspicuous one, the vernacular name is likely to be fixed and in common usage. If the plant is inconspicuous, or if no use is made of it, the vernacular name often is open to suspicion and seldom is in common use. However, the local standards of importance and individual ideas of beauty or conspicuousness may differ from those of the questioning botanical collector. It always is unwise to press for a vernacular name, and it is much better to ask for one indirectly. Many people have a talent for manufacturing them on the spot and find great satisfaction in fooling a foreigner and boasting about it afterward. The senior author greatly admired the ability in this respect of a small boy at Jutiapa. He happened to have a remarkable knowledge of the plants of the region, but he was not content with what he really knew. He would invent a name almost as quickly as a new plant was found, and his names often were extraordinarily suitable and subtle—too much so for belief. Adults in country districts think they will lose face if they can not supply a name for any plant found, and will often make a clumsy effort to manufacture one. And a great many Central Americans, like natives of the United States, make mistakes in recognition of plants, thus giving them incorrect names really belonging to different plants. People who recognize wild plants easily when in the ground, often are unable to place them when they see a detached branch in a work room. Woodsmen usually pay much more attention to the bark and trunk of a tree than to any other portion of it, and if reliable names for trees are desired, it always is better to obtain them from a qualified person standing by the tree in question.

Besides vernacular names from Guatemala, we have cited those known from British Honduras as a matter of course, Maya names of Yucatan that may well be used by the people of Petén, and from Honduras, El Salvador, and the bordering states of Mexico many names that may be used in Guatemala. There have been cited occasionally herbarium names from more remote regions when these have not appeared previously in print.

In describing Guatemalan ranges for species, there is cited each department from which it is definitely known. Most of the department records are based on herbarium specimens, a few on published records, and, in the case of well-known species, sometimes on field

notes, especially in the case of plants so common that specimens were not desired. The altitudinal distribution is given when known. Altitude is a dominant factor in distribution of the majority of the species, but for others, mostly weedy ones, it has little significance. In describing the Guatemalan range of the species, the departments are cited in a definite order, beginning with Petén and proceeding to the North Coast, the Oriente, the central departments, northwestern Guatemala, and finally to the Occidente, ending with the Department of San Marcos. This order is approximate, since the departments cannot be followed in a single line.

In the descriptions of genera and species, words of Latin derivation have been used intentionally, although doubtless not consistently. Latin terms obviously are more intelligible to Spanish-speaking people. In general, in writing the *Flora* two groups of people have been kept in mind: foreign botanists interested primarily in the identity of the plants found in Guatemala, the means of distinguishing them, and data concerning their occurrence and uses within the country; and Guatemalans themselves, who may be interested in some other botanical phases, such as the relation of their plants to those of other countries.

As in other Central American countries, the cryptogamic plants of Guatemala are still imperfectly known. A separate volume of this *Flora* contains an admirable account of Guatemalan mosses, a work unique in its field for the mainland of tropical North America, and perhaps also for South America. The lichens, hepatics, fungi, and algae are less known, and the only papers relating to them are of little use except to specialists in their groups. It is hoped that there may be included in the *Flora* an account of the ferns and their allies. These plants are usually collected and studied with the flowering plants, and treated in much the same manner. They are very numerous in Guatemala, and, of course, much better known than the lower cryptogams.

This *Flora of Guatemala*, while prepared as a descriptive account of the plants of this country alone, will be found useful over a much wider area. In it are included most plants known at present from El Salvador, Honduras, and Nicaragua. It will be found to contain also the larger part of the species of the southern states of Mexico, Chiapas and Tabasco especially, and a large proportion of the plants of even more remote states. Additions and corrections to the *Flora* are being assembled as they come to light. Suggestions and comments are welcomed from outsiders, and will be duly considered for the future elaboration of parts of the *Flora*.



Due to their large size in comparison with the size of other families treated, the Orchidaceae have been published as a unit consisting of two separate numbers, while the Gramineae have been published as part II of the *Flora*. The present part I, beginning with Cycadaceae and ending with Bromeliaceae, therefore, includes all families of Monocotyledons not previously published, but excludes those monocotyledonous families already published in part III, part II (Gramineae), and the two separate parts devoted to Orchidaceae.

### ACKNOWLEDGMENTS

Almost every botanical publication is the result not of the labor performed individually by its author but of the cooperation over a long period of years of a large number of persons, ranging from learned scientists, some of whom date back to the time of Linné or even earlier, down to the most humble and illiterate peasants. It would be preposterous for any one person at the present time to claim full personal credit for such a piece of work. It is, indeed, questionable whether some of the humblest of the cooperatives, whose names never appear in print, do not often deserve prime credit for their aid.

At any rate, a very large number of people have cooperated, over a hundred years and more, to make possible the present account of the flora of Guatemala. So far as the botanists are concerned, they all must have enjoyed their work, else they need not have been doing it. Very few botanists ever are forced to travel to foreign lands; rather, they fight for the privilege.

It is hard to believe that there is any normal person in North America or Europe who would not find something to interest him in Guatemala. Every one would find some phase of nature or man in Guatemala that would be new to him and should therefore hold his interest for at least a fleeting instant. Beauty, perhaps fortunately, can not be measured by any scientific standard, but if it could, Guatemala would have few superiors in natural beauty. Nowhere are there more beautiful and majestic mountains, lovelier lakes and forests, more beautiful wild and cultivated flowers. Nowhere is there a climate that is more agreeable and more invigorating. Nowhere will one find more interesting, more highly varied, and more picturesque people than in Guatemala.

The people of Guatemala have contributed much to the accumulation of data on which our *Flora* is based. From the highest to the

most humble they have been exceedingly helpful when informed of the purpose in our work of collecting and studying the flora of their country. This is no surprise to one familiar with the people of all Central America. It would be a surprise and at once arouse painful speculation, if the people were otherwise than helpful or agreeable. From the people of pure and mixed Spanish blood the greatest courtesy and consideration are to be expected as a matter of course; it is a racial trait. In Guatemala the Indians and the poor among the *ladinos* yield nothing in breeding to their social superiors. We have found them invariably dignified, courteous, kindly, and hospitable. Some of their standards of kindness as exhibited among themselves may seem different from ours, but it must be understood that the poor of Central America often fight to exist under the most stern and harsh conditions. What at first glance may seem harsh to us need not be so for people actually concerned in the matter. A northerner may wince and shudder when he sees the heavy work performed by small children, yet let him observe the care with which a father watches over them, and he will realize that there is no intentional cruelty. Certainly no people are more tender and just to their children than the Indians of Guatemala.

We prefer the Central Americans to help us when we go collecting. We have had many dozens of them to help in collecting, and so far as their ability and understanding of the work went, they were beyond criticism.

It is quite out of the question to mention here all the persons to whom we are indebted for assistance in our field work in Guatemala, their help often of a most practical and frequently very substantial nature. We are sure that they do not expect thanks beyond those offered at the time their services were performed. There are a few, however, whom it would be unfair to omit, and mention is made below of at least some of them, the order in which they are named being purely casual.

We are particularly indebted to a great number of officials of the Guatemalan government for their attentions and assistance in the course of our work. We received most substantial help in our work from the *jefes políticos*, *directores de policia*, and *intendentes* in all parts of the republic. Special thanks are due also to the engineers and their assistants of the national roads system, who always are helpful to travelers who encounter trouble along the roads. In some instances they supplied transportation for us and our baggage.

We are especially grateful to Don Mariano Pacheco Herrarte, then Director General de Agricultura, who always has been a kind

host to visiting scientists, and was particularly gracious to us with advice and practical assistance. Don Mariano's orchid garden is one of the favorite spots of interest to tourists who visit Guatemala, and it is of double interest to botanists. At the FERIA Internacional, held each November in Guatemala City, his exhibits of orchids and agricultural products have been one of the most entertaining and educational displays. One would never suppose ordinarily that a small country could produce so vast a variety of agricultural products. The agricultural exhibits are only part of this great fair, which is well worth a visit even if one has to travel a long distance to reach it.

We are deeply indebted also to Professor Ulises Rojas, well-known botanist of Guatemala and formerly Director of the Jardín Botánico, who has trained most of the younger generation of scientists. He is celebrated also for his *Elementos de botánica general*, whose three volumes form a textbook of botany and contain a great deal of useful information regarding plant life of Central America. Professor Rojas has traveled widely in Guatemala and outside the country, in regions little or not at all known to ordinary visitors. During his travels he has gathered a wealth of information regarding the botany of the region, some of which he has kindly shared with us, thus greatly enriching the present *Flora*. The junior author was his guest for some weeks at his Finca Los Pirineos, from which he explored the mountains of Quezaltenango and the mountain forest of the *barranco* of the Río Samalá.

We are under obligations, too, to Don José Ignacio Aguilar G., who during our visits was Director of the Finca Nacional La Aurora, on the edge of the capital. He later was instrumental in building there the new museum of natural history. Don Ignacio has been very helpful to us in many ways. He assembled a large series of plant specimens, more than 2,000 of them in fact, illustrating the flora of such departments as Guatemala, Escuintla, and Quiché, and this collection has been invaluable in preparation of the present *Flora*. He also furnished lists of the vernacular names applied to many of the plants. For many of these names he is cited as authority on the following pages.

Others to whom the junior author is specially indebted for favors that greatly facilitated his Guatemalan work are the following: General Aurelio F. Recinos, of Huehuetenango; Don Antonio Rodríguez, manager of the chrome mines near Jalapa; the late Don Alejandro Córdoba, proprietor of the newspaper *El Imparcial*, who provided accommodations for collecting on his properties in Sierra de las Minas; Don Hermán and Doña Mercedes Paz R., of Finca Cubilgüitz



in Alta Verapaz; and Don Benvenuto López, *administrador* of Finca Yalpemech, in the same department.

The senior author wishes to express here his deep appreciation of the many courtesies extended to him by Don Guillermo Bonifaz and his charming family of Quezaltenango. The many weeks spent in that city are remembered with particular pleasure because of their cordial reception and kindly hospitality.

We received much direct assistance, as we always have done in other parts of Central America, from the officials of the United Fruit Company, and in western Guatemala from the Compañía Agrícola de Guatemala. They provided ample facilities, otherwise nearly or quite impossible to obtain, for collecting in the lowlands where the banana plantations are located. We wish to mention especially in this connection Dr. N. C. Mcphail, of Quiriguá Hospital, who is widely esteemed and respected in Central America; Mr. George Austin, of Puerto Barrios, whose courtesy and patience with visiting scientists from the North seem never to be exhausted; and Dr. Wilson Popenoe, who as always has been uncommonly helpful with his advice, the result of many years spent in Central America, and with his very substantial and direct aid in procuring quarters from which field work was done. Several officials of the Ferrocarril Internacional de Centro-América also have extended favors that helped in the success of our work. We are particularly indebted to Mr. and Mrs. Bevan B. Lewis, formerly of Guatemala City.

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From botanists of the United States we have received a great deal of valued help in determination of certain Guatemalan groups. These persons are mentioned under the families or genera of plants in which they are interested.

For data regarding the properties of Guatemalan woods we have relied on *Timbers of the New World*, by Samuel J. Record and Robert W. Hess. For many years the late Professor Record and the

senior author of this *Flora* were closely associated in studies of Central American forests, and often were able to be mutually helpful in the work. Professor Record's keen interest in all that pertained to the forests of Central America will be greatly missed. The volume of which mention is made here will be found invaluable to all who are in any manner interested in tropical American woods, since it is a veritable encyclopedia of information regarding all their phases.

The senior author is exceptionally indebted to one person who during both his visits to Guatemala was a dependable counsellor and one of the most delightful traveling companions that ever could be found: Dr. John R. Johnston, then Director of the Escuela Nacional de Agricultura at La Alameda, near Chimaltenango. Several weeks were spent with great profit at La Alameda while enjoying Dr. Johnston's hospitality, and our many joint collecting trips will be long remembered. His enthusiasm in the field, his unfailing patience and his good humor in the face of petty difficulties, his keen interest in everything new, made field trips in his company a delight. His long years of experience in the Latin American countries have given him unusual appreciation of the countries and people of Central America, and few indeed are the North Americans who consider the Central American people with such sympathy and high regard.

For the photographs from which the illustrations in this part of the *Flora* are made, we are indebted to the following persons: Dr. Albert E. Vatter, Jr., who accompanied the junior author on his second Guatemalan expedition, and made several hundred photographs in black and white and also in kodachrome; to Dr. John R. Johnston, who made many photographs while Director of the Escuela Nacional de Agricultura; and to Dr. C. L. Wilson, of Dartmouth College, who has made many handsome photographs in the lower mountains of Alta Verapaz.

### CYCADACEAE. Cycad Family

*Reference:* J. Schuster, Cycadaceae, Pflanzenreich IV. 1: 1-168. 1932.

Palm-like plants, the caudex sometimes bulb-like or tuber-like, often columnar and elongate, simple or branched, bearing at its apex few or numerous leaves; leaves spirally arranged, often forming a dense crown at the apex of the trunk, coriaceous, pinnate or bipinnate, the leaflets opposite or alternate, usually linear or lanceolate, often oblique, glabrous in age but often tomentose when young, entire or dentate, parallel-nerved, the petiole usually aculeate; flowers dioecious, naked, the inflorescences borne at the apex of the caudex among the leaves, strobiliform, terminal or axillary, the staminate strobiles narrower than the pistillate; microsporophylls thick, spreading at about a right angle, short-stipitate, narrowly or broadly cune-



ate, bearing on the lower surface very numerous microsporangia, the terminal portion sterile, acuminate, attenuate, or peltate; microsporangia sessile or very shortly stipitate, 2-6 aggregate in a sorus, oblong or subglobose, dehiscent at the apex by a median line; pollen smooth, ellipsoid or subglobose; pistillate strobiles pedunculate, cylindric or ovoid; macrosporophylls various in form, pedicellate, the terminal portion usually peltate-dilated, the macrosporangia inserted at the base of the peltate portion; macrosporangia orthropous, sessile or subsessile, covered by a single tough integument, the micropyle long and narrow; seeds oval or broadly ellipsoid or globose, the putamen smooth, striate, or costate, terete or obtusely angulate, usually with osseous foramina at the base; endosperm fleshy; cotyledons 2, rarely 3-6, fleshy, oblong.

Nine genera are recognized, of rather wide but often localized distribution in the tropics of both hemispheres. Only four of the genera are American, and only three genera are represented in Central America.

Leaflets 1-nerved, not articulate with the rachis. . . . . *Cycas*  
 Leaflets several-nerved, articulate with the rachis.

Scales of both pistillate and staminate cones with 2 horn-like appendages at the center. . . . . *Ceratozamia*

Scales of the pistillate and staminate cones peltate, not appendaged. . . . *Zamia*

### CERATOZAMIA Brongniart

Trunk low, ovoid or cylindric, simple or dichotomously branched; petioles aculeolate, the rachis of the leaf circinnate in vernation, the undeveloped leaflets imbricate; leaflets elongate, narrowly or broadly lanceolate to obovate, attenuate-acute, narrowed to the base, opposite or alternate, articulate at the base, entire, the margins revolute, several-nerved; staminate strobile cylindric or narrowly elongate; microsporangia cuneiform, the sterile portion pyramidal-truncate or sub-applanate, with 2 horn-like appendages; pistillate cone ellipsoid; macrosporophylls ovuliferous on both sides, borne on a stout stipe, the apex transverse-hexagonal, bearing 2 horn-like appendages at the middle; macrosporangia ovoid, sessile.

Two species are usually recognized, one Mexican and apparently little known. Chamberlain recognizes at least six species.

***Ceratozamia mexicana*** Brongn. Ann. Sci. Nat. III. 5: 8. *pl.* 1. 1846. *Costilla de león*. Figure 1.

Rocky wooded stream banks or rocky hillsides, 900-1300 meters; Huehuetenango (Sierra de los Cuchumatanes: San Andrés; Finca Soledad, 5 miles southeast of Barillas; Río Amelco). Oaxaca and Veracruz, and perhaps elsewhere in southern Mexico.

Plants acaulescent or with a short, ovoid or globose trunk, in age becoming longer and cylindric, covered by the persistent cataphylls and leaf bases, more or less fuscous-tomentose, simple or sometimes dichotomous; leaves erect at first, spreading in age and recurved, 1-3 meters long, the young ones often pruinose-



S. H. Grove

FIG. 1. *Ceratozamia mexicana*. a, Staminate strobile ( $\times \frac{1}{4}$ ). b, Cone scale ( $\times \frac{1}{4}$ ). c, Habit, pistillate plant ( $\times \frac{1}{8}$ ).

glaucous and pilose, the larger ones with 7-75 pairs of leaflets; petioles terete, armed with short sharp spines for their whole length, the rachis armed with scattered small spines; leaflets alternate or opposite, straight or slightly falcate, narrowly or broadly lanceolate or subdimidiate-obovate from a cuneate base, gradually or abruptly attenuate-acute, the margins thick and subrevolute, paler beneath, coriaceous, 14-35 cm. long, 2-7 cm. wide, 17-40-nerved; staminate strobile cylindric, acute or subobtusate, 50 cm. long or shorter, 1.5-5 cm. thick, pedunculate; microsporophylls cuneiform, 1-1.5 cm. long, the fertile portion 1 cm. long; pistillate strobile ellipsoid, conic-acute, 8-15 cm. long, 1.5-6.5 cm. broad, borne on a peduncle 5 cm. long; cone scales hexagonal at the apex, 1.5-2.5 cm. broad, fuscous-tomentose; putamen ligneous, subellipsoid, substrate, brownish, about 2 cm. long and 1 cm. broad.

A showy and handsome plant, better adapted to cultivation than the local species of *Zamia*. Plants brought from Finca Soledad are in cultivation in the garden of Don Marcos Recinos at Huehuetenango.

### CYCAS L.

Plants usually tree-like, the trunk cylindric, erect; leaves pinnatisect, the leaflets numerous, the lowest ones often spine-like, linear or linear-lanceolate, the margins incurved or thickened; staminate strobile oblong-ovoid or oblong, the microsporophylls cuneiform, usually acuminate; pistillate strobile terminal in the center of the trunk; macrosporophylls imbricate, borne on a linear stipe, the blades various in form, bearing on either side near the narrowed base 2 or more alternate or opposite macrosporangia, these ovoid-globose or obovoid; putamen more or less biangulate or rarely triangulate.

Five species are usually recognized, in the Old World tropics. Chamberlain recognizes at least twenty species. Sago starch obtained from the trunks has been and still is an important food in regions where the plants are native. The seed coats have a good percentage of oil and are rarely used as food. The starch-rich kernels, however, are commonly used as food.

*Cycas revoluta* Thunb. Fl. Japon. 229. 1784.

Planted commonly for ornament in parks and gardens of Guatemala, from the Pacific coast up to the central highlands (to at least 1500 meters), also about Cobán, and doubtless in other parts of the country. Native of the East Indies and southeastern Asia.

Adult trunks sometimes attaining a height of 8 meters but usually lower, often very thick, subannulate, the leaf scars rhombic-quadrangular; leaves often very numerous, borne at the top of the trunk, about 75 cm. long, long-persistent, tomentose at first but soon glabrate, the petioles spiny; leaflets about 125 pairs, crowded, the largest ones 9-18 cm. long and 5-6 mm. wide; staminate strobile cylindric or ovoid-oblong, 8-40 cm. long, 1.5-4 cm. thick; seeds yellow-orange or yellow, covered with a dense tomentum, 1.5-3.5 cm. long.



There are many handsome individuals of this species in the parks of Guatemala, as in the Parque Central of Guatemala, in Antigua, Cobán, and Retalhuleu and Mazatenango. Cones are often produced. Rare in cultivation in Guatemala is *Cycas circinalis* L., of the East Indies, in which the leaflets are about 12 mm. wide, and have flat rather than incurved margins.

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*Dioon edule* Lindl., a Mexican plant with pale foliage and very numerous rigid, not articulate leaflets, is in cultivation in Guatemala, but is rare. The genus *Dioon*, consisting of three or four Mexican species of tree-like plants, extends southward in Mexico to the State of Chiapas. As a species, *D. Mejiae* Standl. & Williams, has recently been described from Honduras; it is probable that the genus occurs in Guatemala. The rather ambiguous and little-known *D. Dohenyi* E. A. Howard has been ascribed through some mistake to Guatemala, but its author and collector states (*Touring Topics*, March, 1933, p. 11) that it was actually collected in the mountains of Chiapas, about 100 miles north of the Guatemalan border and 30 miles inland from the coast.

## ZAMIA L.

Plants usually low and with a hypogaeal trunk, or sometimes developing above ground an elongate caudex, often tuber-like, simple or sparsely branched; leaves pinnate, with few or numerous leaflets, the petiole aculeate or unarmed, the leaflets articulate at the base, entire or dentate near the apex, mostly linear or lanceolate; staminate strobiles cylindric or elongate-cylindric; microsporophylls pedicellate and peltate or cuneiform-peltate, the microsporangia arranged beneath in 2 separate or confluent areas or in a marginal series on each side; scales truncate-pyramidal to hexagonal; pistillate strobile cylindric or ovoid-elongate; macrosporophylls pedicellate-peltate, biovulate beneath, the scales hexagonal or subquadrangular; macrosporangia ovate or subtrigonal-ovate, ferruginous to orange, yellow, or whitish.

A group of about 25 species, all American, chiefly in North America and West Indies. The Central American species still are imperfectly known because of the scant material available for study, but about eight species have been reported from all Central America.

Leaflets entire, rarely with a few teeth near the apex.

Leaflets obovate to broadly oblanceolate, mostly 6–10 cm. wide . . . *Z. Tuerckheimii*

Leaflets lance-linear, mostly 2–3 cm. wide . . . . . *Z. monticola*

Leaflets conspicuously spinulose-serrate, usually from about the middle to the apex, sometimes for almost their whole length.

Leaflets relatively small, mostly 1.5–2.5 cm. wide . . . . . *Z. Loddigesii*

Leaflets larger, mostly 5–7 cm. wide . . . . . *Z. muricata*

**Zamia Loddigesii** Miq. Tijdschr. Nat. Geschied. 10: 73. 1843. *Z. latifolia* Lodd. ex A. DC. in DC. Prodr. 16, pt. 2: 541. 1868. *Z. cycadifolia* Dyer in Hemsl. Biol. Centr. Amer. Bot. 3: 195. 1883. *Z. Herrerae* Cald. & Standl. Journ. Wash. Acad. Sci. 14: 93. f. 1. 1924. *Z. spartea* A. DC. op. cit. 539. 1868. *Z. Loddigesii* var. *longifolia* Schuster, Pflanzenreich IV. 1: 147. 1932. *Z. Loddigesii* var. *latifolia* Schuster, loc. cit. *Z. Loddigesii* var. *cycadifolia* Schuster, op. cit. 148. *Z. Loddigesii* var. *spartea* Schuster, op. cit. 148. *Camotillo*; *Cocalito*; *Teosinte* (north coast, fide Rojas); *Chacuhua* (Petén, fide Lundell). Figure 2.

Open slopes or fields, sometimes in wet or moist thickets or forest, occasionally in lowland pine forest, lowlands of both coasts at sea level or but little higher; Petén; Izabal; Santa Rosa; Retalhuleu. Southern Mexico and British Honduras; Honduras; El Salvador.

Caudex usually hypogaeal, subcylindric or often tuberous and fleshy, sometimes 20 cm. high; petioles densely or sparsely aculeate, the spines short, straight, rigid, mostly 1–2 mm. long, puberulent or glabrate; leaflets variable in size and shape, linear-lanceolate to obovate-oblong, usually 20 pairs or fewer, long-attenuate to subobtuse at the apex, mostly 10–25 cm. long and 12–25 mm. wide, sometimes somewhat larger, opposite or alternate, spinulose-serrate, usually conspicuously so, above the middle or for almost their whole length; staminate strobiles 3.5–6.5 cm. long, about 2 cm. thick, conic or obtuse at the apex, the scales fulvous-tomentose, 4–6-sided; pistillate strobile thick-cylindric, cuspidate, about 5.5 cm. long, the peduncle equaling or often exceeding the strobile, its scales quadrangular-rhombic or 6-angulate, 7–8 mm. wide; seeds ligneous, ovoid, about 13 mm. long and 7 mm. wide.

According to Schuster, the plant reported by Hemsley (Biol. Centr. Amer. Bot. 3: 194. 1883) as *Z. Ottonis* Miq. is perhaps referable here. The plant is a variable one, segregated by some authors into several species, and Schuster recognizes several varieties, of which vars. *longifolia* and *spartea* are reported from Guatemala, but the varieties are based upon what appear to be characters of scant importance. The plant is sometimes seen in Guatemalan gardens and is said to grow readily from seeds. It has been reported from Guatemala under the name *Z. furfuracea* L., which pertains to a Mexican species. The camotillo is one of the most celebrated plants of Central America, where it is widely known because of its poisonous properties. The large starchy roots are reported to be used in Petén for poisoning rats, and it is believed that they have been used many times in Central America for criminal poisoning of human beings. There is a popular belief that if the roots have been out of the ground one day and are used for poisoning, they kill in one day; if out of the ground ten days, they kill in ten days, and so on. It is unnecessary



FIG. 2. *Zamia Loddigesii*. Habit ( $\times \frac{1}{2}$ ).



to state that there can be little basis for this belief, but there is no doubt that they are poisonous. The starchy roots of various species of the genus were much used by some of the aborigines, especially the Caribs, as food, but they well knew that the poisonous properties must first be removed by thorough cooking. Some of the *Zamia* species supplied the article known as Coontie, an important food staple of the Florida Indians. Wisdom reports that in the Jocotán region of Chiquimula the dry roots of what are presumed to be identified as *Zamia* are sometimes chewed and the saliva is swallowed to relieve cough and also to improve the singing qualities of the voice. He states further that the roots mixed with lime are used by the Indians of Jocotán for coloring tobacco pipes and other articles red. The name "cocalito" was said to be given this plant because of the resemblance to a small coconut palm, but the resemblance is not particularly striking.

***Zamia monticola*** Chamberlain, Bot. Gaz. 81: 219. *f.* 1-13. 1926.

Alta Verapaz, cliffs above Río Chiacé, 540-600 meters, on limestone, Finca Volcán; also at Finca Arenal; between Chajmayic and Sebol, at 300-500 meters. Type from Volcán de Naolinco, near Jalapa, Mexico.

Trunk as much as 20 cm. high and 15 cm. in diameter; petioles sparsely aculeate; leaves as much as 2 meters long, the leaflets about 30-34 pairs, opposite or alternate, linear-lanceolate, falcate, 24-35 cm. long or more, 3-4 cm. wide, gradually attenuate to the tip, shortly narrowed at the base, lustrous when dried, sometimes slightly serrulate near the apex but usually entire, the nerves about 30; staminate strobiles oblong-ovoid, 12-16 cm. long, on a peduncle 10-17 cm. long; microsporophylls with a hexagonal apex; microsporangia 10-16, in 2 widely separated series.

***Zamia muricata*** Willd. Sp. Pl. 4: 847. 1805. *Z. variegata* Warsc. in Otto & Dietr. Allgem. Gartenz. 13: 253. 1845. *Z. picta* Dyer in Hemsl. Biol. Centr. Amer. Bot. 3: 194. 1883. *Z. muricata* var. *picta* Miq. Wiss. Nat. Tijdschr. 1: 198. 1846-47. *Camotillo*.

Wet forest or dry pine ridges, Izabal, at 600 meters or less. Reported also from Mexico (Oaxaca), Colombia, and Venezuela.

Trunk sometimes 2.5 meters tall, often wanting, at least in young plants, simple or branched; leaves large, the petiole terete, aculeate, glabrous except at the base, there tomentose; leaves 10-12 pairs or more, alternate or subopposite, lanceolate or oblong-lanceolate, sometimes oblong-oblancoelate, up to 35 cm. long, sometimes 8 cm. wide, acuminate, contracted at the base, spinulose-denticulate from the apex sometimes almost or quite to the base, lustrous above when dried, paler beneath; staminate strobiles cylindric, conic-acuminate or obtuse, 3-6 cm.

long, 1 cm. thick, on peduncles 4–11 cm. long, the scales hexagonal, 6 mm. broad or less; pistillate strobiles cylindric, 5–11 cm. long, 3–3.5 cm. thick, on a peduncle 4–6 cm. long; seeds ovoid, trigonous-compressed, red at maturity, 3 cm. long, 2 cm. thick.

Var. *picta* was based upon plants grown in Europe and supposed to be of Guatemalan origin. There is some question as to the determination of the recent collections referred to this species. They may, in fact, represent two distinct species. They are closely related to *Z. Skinneri* Warsc., so far as leaves are concerned, except that the leaf nerves are not sharply elevated as in that plant of Panama and Costa Rica. It seems very improbable that a species of this genus actually ranges from Guatemala to Venezuela, especially since it has not been collected in the intervening areas. Further and more complete collections are necessary to determine the relationship of all the Guatemalan members of the genus *Zamia*. Most of the recent collections are sterile, although it must be stated that the leaves and not the cones seem to afford the most dependable characters for separating the species, the cones apparently varying but little in closely related species.

***Zamia Tuerckheimii* Donn. Smith, Bot. Gaz. 35: 8. pl. 1. 1903.**  
Figure 3.

Wet limestone thickets or forest, Alta Verapaz, 300–1100 meters; type from Cubilgüitz, *Tuerckheim* 7786; collected also at Finca Volcán, where said to be common on slopes of the higher hills; at Finca Seamay, near Senahú; and on rocks between Campur and Socoyó, on the Petén Highway. Reported from British Honduras; Atlantic coast of Honduras (Lancetilla Valley near Tela).

Trunk almost none or often elongate and sometimes 3 meters long, often pendent from rocks and S-shaped, 20 cm. in diameter or less, simple; petioles slender, sparsely aculeate or sometimes unarmed; leaflets mostly 5–9 pairs, subopposite, very lustrous when dried, somewhat paler beneath, ovate-lanceolate to oblong-elliptic or oblong-obovate, mostly 12–25 cm. long and 4–8 cm. wide, abruptly acuminate, entire, contracted at the base, the nerves 40 or more; staminate strobile narrowly cylindric, about 14 cm. long and 2.5 cm. wide, apiculate, the scales truncate-pyramidal, hexagonal; pistillate strobile borne on a peduncle 2 cm. long, about 18 cm. long and 6 cm. broad; seeds red, obovoid, 2 cm. long, 13 mm. broad.

Excellent material of the species was collected around Finca Volcán by Dr. C. L. Wilson, who also made handsome photographs of the plant. It is plentiful in some places along the newer part of the Petén Highway, growing upon the tops and sides of great jagged blocks of the characteristic limestone of the region. The S-shape of the more elongate trunks is very characteristic of the plant.



FIG. 3. *Zamia Tuerckheimii*. a, Pistillate strobile ( $\times \frac{1}{4}$ ). b, c, Macrosporophyll ( $\times \frac{1}{4}$ ). d, Macrosporangium ( $\times \frac{1}{4}$ ). e, Habit of pistillate plant ( $\times \frac{1}{16}$ ). f, Portion of leaf ( $\times \frac{1}{4}$ ). g, Habit of staminate plant ( $\times \frac{1}{12}$ ). h, Staminate strobile ( $\times \frac{1}{2}$ ). i, Microsporophyll, viewed from above ( $\times 1\frac{1}{2}$ ). j, k, Microsporophyll ( $\times 1\frac{1}{2}$ ).

## PODOCARPACEAE

*Reference:* R. Pilger, *Taxaceae*, *Pflanzenreich* IV. 5: 94. 1903.

Usually tall trees; leaves usually spirally arranged, rarely opposite, persistent, thick and coriaceous, often spreading from the branch in a single plane, linear or lanceolate, rarely ovate, sometimes scale-like; flowers usually dioecious; staminate flowers composed of stamens only, sometimes surrounded at the base in bud by involucre-like rigid scales, terminal or solitary and axillary or in few-flowered, mostly axillary inflorescences, these usually ament-like, the stamens numerous, spirally imbricate; anthers 2-celled, usually ovoid and dehiscent by slits; pistillate flowers usually solitary in the leaf axils, the flowers naked, often subtended by sterile scales; carpels 1-many, each consisting of a single naked ovule, usually con-



nate with an epimatium (an excrescence from the carpel); fruit larger than the flowering carpel but retaining its form, the seed covered by a coat consisting of the integument and the enlarged epimatium.

About 5 genera, in tropical and temperate regions of both hemispheres. A single genus occurs in North America.

### PODOCARPUS L'Héritier

*Reference:* John T. Buchholz and Netta E. Gray, A taxonomic revision of *Podocarpus*, Journ. Arnold Arb. 19: 123-151. 1948.

Usually tall trees; leaves linear to lanceolate or ovate, usually acute or mucronate, spirally arranged or rarely opposite, usually spreading in a single plane from the branch; flowers dioecious or rarely monoecious, the staminate usually solitary or few and sessile or pedunculate in the leaf axils, surrounded at the base by sterile scales; anthers usually imbricate, 2-celled; pistillate flowers usually solitary and pedunculate in the leaf axils, the receptacle fleshy, with 1-2 carpels, these 1-ovulate; seeds usually large, more or less apiculate, enclosed in a double testa, the outer fleshy, the inner usually ligneous.

About 60 species, in tropical or temperate regions of both hemispheres. One other species and several additional varieties are known from southern Central America (Costa Rica and Panama). *Podocarpus Blumei* Endl., native of southern Japan, is in cultivation in Finca La Aurora, Guatemala. It has ovate to lance-ovate leaves as much as 3-4 cm. wide. Another species, *P. Harmsianus* Pilger, native to South America, and similar to *P. Standleyi* Buchholz & Gray of the Costa Rican mountains, is planted in the garden of Don Mariano Pacheco in Guatemala.

Terminal bud scales long-acuminate, 3-4 or more times as long as wide. *P. Matudai*  
Terminal bud scales ovate, acute, obtuse or apiculate, but not attenuate.

Vegetative bud scales apiculate.....*P. guatemalensis*  
Vegetative bud scales acute or obtuse.....*P. oleifolius*

***Podocarpus guatemalensis* Standl. Proc. Biol. Soc. Wash. 37: 49. 1924.**

Known only from the type, Puerto Barrios, Dept. Izabal, *Standley* 25090.

A tree up to 20 meters tall, the trunk up to 70 cm. in diameter; bark reddish brown, scaly; vegetative buds spherical or ovoid with broad ovate bud scales apiculate or obtuse, scarious at margins or not so; leaves lanceolate, those of lower branches or saplings up to 14 cm. long, 10-12 mm. wide, distinctly ridged at midvein, flat or depressed below midvein, cuneately narrowed near base, narrowed toward apex, those of mature reproductive branches usually up to 10 cm. long and less than 10 mm. wide; upper hypoderm interrupted; auxiliary sclereids lacing in

palisade or mesophyll; vascular sclereids lacking; pollen cones cylindrical, axillary to leaves or scales of previous year's growth; seed cones axillary; seed on short peduncles up to 4–5 mm. long, receptacles up to 7 mm. long; seeds ellipsoidal, up to 8 mm. long with small conical crests.

The type was taken from a low shrub growing in the densely wooded swamps about Puerto Barrios. The shrub was probably a casual introduction there, perhaps brought down from the hills by some stream, for further exploration in the neighborhood has failed to reveal other plants of the species, which grows normally in the hills.

Two varieties have been recognized, *Podocarpus guatemalensis* var. *pinetorum* (Bart.) Buchholz & Gray, known only from British Honduras, and *P. guatemalensis* var. *Allenii* (Standley) Buchholz & Gray, known from Costa Rica and Panama. *Podocarpus guatemalensis* var. *pinetorum*, the type of which comes from Mt. Pine Ridge, El Cayo District, *Bartlett 13109*, differs from typical *P. guatemalensis* in having much larger terminal buds with broader, thicker scales and shorter, narrower, and thicker leaves.

***Podocarpus Matudai* Lundell, Phytologia 1: 212. 1937.**

Forests of southern Mexico at 1250–2370 meters, the type from Mt. Pasitar, Chiapas, *Matuda 698*.

A large tree, the trunk up to 1.5 meters or more in diameter; terminal buds large with narrowly lanceolate, somewhat spreading scales; leaves coriaceous, lanceolate, 4–9 cm. long, 10–15 mm. wide, up to 16 cm. long and 19 mm. wide on vigorous shoots, narrowly acute at apex, narrowed to a petiole below, with a somewhat rounded ridge above midvein, becoming less prominent toward apex and less prominent below; auxiliary sclereids scattered in palisade and mesophyll, vascular sclereids both above and below bundle; pollen cones sessile, cylindrical, arising from axillary buds of previous season's growth, becoming 3–3.5 cm. long, 4 mm. wide, surrounded by broad, carinate apiculate scales, shedding pollen in January or later; microsporophylls with upturned obtuse apices with scarious, denticulate margins; seed cones on short peduncles 4–6 mm. long, receptacle of a pair of fused thickened scales 4–6 mm. long, with short obtuse apices; seed 8–10 mm. long, 7–8 mm. wide, with a blunt crest scarcely evident.

***Podocarpus Matudai* var. *macrocarpus* Buchholz & Gray, Journ. Arnold Arb. 19: 132. 1948. *Ciprecillo*; *Tabla* (Chiapas); *Curus-té* (Huehuetenango).**

Usually in moist or wet, mountain forest, mostly at 1200–2600 meters, but sometimes occurring much lower in Guatemala; El Progreso (Sierra de las Minas, Montaña Canahui); Chiquimula (Cerro Brujo); Guatemala; Huehuetenango (at various places in Sierra de los Cuchumatanes; between Ixcán and Finca San Rafael at only 200–800 meters). Chiapas (type from Mt. Ovanda).

Like the species, but with longer pistillate peduncles, 9–18 mm. long, and larger seeds, more than 12 mm. long; pollen cones 4–6 cm. long, maturing earlier than the species.

**Podocarpus oleifolius** D. Don in Lambert, *Pinus* 2: 20. 1824, ed. 2. 2: 121. 1828.

Cloud forests at 2000–3200 meters in Guatemala; Zacapa (Sierra de las Minas, Cerro de Monos and Río Repollal, Volcán Gemelos); Baja Verapaz (Sierra de las Minas east of Chilascó). Southern Mexico (Chiapas and Oaxaca); El Salvador; Honduras; Costa Rica; western South America. Figure 4.

A tree up to 20 meters tall; bark yellowish brown; vegetative buds globose, the bud scales rounded or broadly ovate, obtuse and scarious margined; leaves coriaceous, narrowly lanceolate, 2.5–8 cm. long, 5–12 mm. wide, up to 15 cm. long and 20 mm. wide on sprouts and vigorous shoots, with a conspicuous narrow groove above the midvein, broad but not very prominent beneath; upper hypoderm continuous; vascular sclereids usually present; auxiliary sclereids usually present; pollen cones solitary, axillary, 3 cm. long, 3 mm. wide, arising from sessile buds of previous year's growth; microsporophylls tipped with upturned rounded apiculus; pistillate cones solitary, axillary, the peduncles 5–10 mm. long, receptacle of 2 fused fleshy scales free at tip, 6–9 mm. long; seed globose-ovoid with a suppressed crest, 7–8 mm. long.

Three varieties are recognized, two (var. *macrostachyus* and var. *trujillensis*) from northern South America and one (var. *costaricensis*) from Costa Rica and Panama.

## ARAUCARIACEAE

*Reference:* R. Pilger, *Araucariaceae*, *Pflanzenfamilien* ed. 2. 13: 249–266. 1926.

Mostly large trees; leaves small or large, needle-like or rather broad, persistent; flowers dioecious or rarely monoecious; staminate flowers large, terminal and fasciculate on short branchlets, or sometimes axillary; stamens numerous, spirally arranged, the filament dilated into a broad scale, the sporangia or anthers numerous, free, linear, arising on the lower side of the scale; pistillate flowers terminal on short branchlets, consisting of numerous scales without bracts; fruit a globose or ovoid cone, falling apart at maturity, the scales numerous, spirally arranged, broad, imbricate, thickened at the apex, sometimes winged; ovary 1; cotyledons usually 2, rarely 4.

Only one other genus is known, *Agathis*, with about 20 species in southeastern Asia and the islands of the southern Pacific. All species of both genera are confined to the southern hemisphere.

## ARAUCARIA Jussieu

Tall evergreen trees, the branches regularly verticillate, spreading; leaves alternate, decurrent at the base, spreading, sometimes 2-ranked, subulate to ovate-





S. H. Grove

FIG. 4. *Podocarpus oleifolius*. a, Leafy branch with staminate flowers ( $\times \frac{2}{3}$ ).  
b, Fruit ( $\times \frac{2}{3}$ ).

lanceolate, usually very stiff; flowers commonly dioecious, the staminate terminal and fasciculate; anthers with 8–15 sporangia; pistillate flowers terminal, ovoid or subglobose, composed of numerous scales without bracts; fruit a cone, ovoid or subglobose, falling apart when mature, the scales cuneate; seeds large, adherent to the scales; cotyledons 2–4.

About 10 species, in South America, Australasia, and the Pacific Islands. Some of the species are important forest trees of South America, from Brazil southward, where they furnish timber used extensively for furniture and general construction. The large seeds of some species are edible.

Leaves broad and flattened, 6–17 mm. wide, mostly 1.5–5 cm. long . . . *A. Bidwillii*  
 Leaves all or mostly subulate or needle-like, the adult ones only 1–4 mm. wide and 5–12 mm. long.

Leaves of sterile branches 4–12 mm. long, curved upward, not spine-tipped, triangular in cross section . . . *A. excelsa*

Leaves of sterile branches 7–25 mm. long, almost straight, spine-tipped, much compressed . . . *A. Cunninghamii*

### ***Araucaria Bidwillii* Hook. Lond. Journ. Bot. 2: 503. 1843.**

Native of Australia; planted frequently in Guatemala for ornament.

A large tree as much as 50 meters high, the trunk free of branches for half its length or more; leaves appearing 2-ranked on the branches, spreading, narrowly lanceolate to ovate-lanceolate or broader, spine-tipped, deep green and lustrous, very thick and rigid; branches usually in whorls of 10–15; staminate flowers 5–7.5 cm. long; cones globose-ovoid, about 22 cm. long and 18 cm. broad, the scales 2.5–5 cm. wide, with acute edges; seeds 5–6.5 cm. long, 2 cm. broad, with long compressed curved tips.

There are numerous fine trees of this species planted in the mountains of Guatemala, chiefly at middle elevations but frequently as high as 2700 meters. Some of them have probably attained almost as great a height as those native in Australia. Large trees are to be seen in many of the parks and sometimes in the larger patios, particularly about Antigua, Totonicapán, and San Marcos.

### ***Araucaria Cunninghamii* Sweet, Hort. Brit. 475. 1827.**

Native of Australia; planted for ornament about San Marcos, and doubtless in other parts of Guatemala.

A tree sometimes 60 meters high in its native habitat, the branches in whorls of 4–7, the lower ones widely spreading, the upper branches ascending; leaves rigid, slender, almost acicular, sharp-pointed, straight or nearly so, strongly compressed laterally, conspicuously carinate on both sides, quadrangular, scarcely falcate; staminate flowers 5–7.5 cm. long; cones ovoid-globose, 7.5–9.5 cm. long, 7.5 cm.

broad; cone scales broadly cuneate, coriaceous, 1.2 cm. wide, terminating in a rigid recurved mucro.

***Araucaria excelsa*** R. Br. in Ait. Hort. Kew. ed. 2. 5: 412. 1813.  
*Norfolk Island Pine.*

Native of Norfolk Island, between New Zealand and New Caledonia; planted occasionally for ornament in Guatemala parks and gardens, chiefly at middle or rather high elevations.

A tall tree, sometimes 60 meters high, at first pyramidal, in age with a more elongate crown, the branches in whorls of 4-7, horizontal or the lower ones somewhat drooping; leaves small, subulate, upcurved, dark green, closely set on the branchlets; cones subglobose, brown, 10-15 cm. in diameter; cone scales 8-9 mm. long, with a stout incurved mucro.

Seedlings of this tree make handsome pot plants, often seen in the United States and occasionally in Guatemala. One very large tree at the Hotel Manchén in Antigua was said by its owner to be 45 meters high, but the accuracy of the measurement is questionable. Great quantities of the terete older branchlets often are shed by the trees, sometimes completely covering the ground.

### CUPRESSACEAE. Cypress Family

*Reference:* R. Pilger, Cupressaceae, Pflanzenfamilien 13: 361-403. 1926.

Trees or shrubs, the trees usually not very large, the shrubs sometimes prostrate, often densely branched; leaves small, scale-like or needle-like but short, decussate or 3-ranked, most often closely appressed to the branchlets, both needle-like and scale-like leaves often found on the same plant, the leaves of seedling plants all needle-like; flowers monoecious or dioecious, very small, solitary and terminal on short twigs or solitary in the leaf axils, the sporophylls opposite or ternate; stamens with short filaments and broad anther-bearing scales; sporangia usually 3-6, ellipsoid, free; pistillate inflorescence of 3-8 scales, some or all of these bearing 1-2 ovules; scales of the pistillate inflorescence becoming woody or fleshy in fruit and more or less completely fused, or sometimes free at maturity; seeds small, free, sometimes winged; cotyledons usually 2, rarely 5-6.

Sixteen genera are known, widely dispersed in both hemispheres, chiefly in temperate regions. Only two genera are native in Central America, and these only in Guatemala. Two others, *Libocedrus* and *Chamaecyparis*, are found in North America.

Branchlets compressed and flat; fruit a woody dehiscent cone. . . . . *Thuja*  
Branchlets terete or 4-sided.

Fruit berry-like, fleshy, indehiscent, 1-4-seeded; needle-like leaves, when present, with whitish bands or marks on the upper surface. . . . . *Juniperus*



Fruit a dry dehiscent woody cone, many-seeded; needle-like leaves, when present, with whitish bands or marks on the lower surface. . . . . *Cupressus*

## CUPRESSUS L. Cypress

Evergreen trees or shrubs, the bark shredded, the branchlets terete or 4-angulate; leaves aromatic, opposite, small and scale-like, minutely denticulate, appressed, but on young plants or branches linear-subulate and spreading; flowers solitary, minute, terminating short branchlets, monoecious, the staminate and pistillate on separate branches; staminate flowers ovoid or oblong, yellow, consisting of 6-12 decussate stamens, each stamen with 2-6 pendulous globose anther cells; pistillate flower subglobose; cones globose or subglobose, maturing the second season, composed of 6-12 peltate scales, these becoming ligneous, usually with a mucro at the flattened apex of each scale, this bearing numerous, compressed and angulate, winged seeds, the lower scales usually smaller and sterile; cotyledons 3-4.

Species about 12, in the warmer temperate and subtropical regions of both hemispheres, represented in Central America by a single species. In America the genus reaches the southern limit of its distribution in Guatemala. The heartwood in this genus is yellowish, pale brown, or pinkish, sometimes streaked or variegated, the sapwood white; of rather high luster, fragrant; light and soft to hard and heavy, of very fine and uniform texture and straight or irregular grain; easy to work and of high durability. The lasting properties of the wood are attested by the fact that wood of Old World cypress, *Cupressus sempervirens* L., was used for constructing the gates of Constantinople and the doors of St. Peter's, which remained sound until their removal after eleven centuries of use.

***Cupressus lusitanica*** Miller, Gard. Diet. ed. 8. no. 3. 1768. *C. Lindleyi* Klotzsch ex Lindl. Syn. Conif. 59. 1847. *C. Benthamii* Endl. loc. cit. *C. lusitanica* var. *Benthamii* Carrière, Traité Gén. Conif. ed. 2. 155. 1867. *C. Knightiana* Knight & Perry ex Gordon, Pinet. 61. 1858. *C. lusitanica* var. *Knightiana* Rehder, Journ. Arnold Arb. 1: 52. 1919. *C. Benthamii* var. *Knightiana* Masters, Journ. Linn. Soc. 31: 340. 1896. *Ciprés*; *Tsicap* (Jacaltenango); *Tzis* (Huehuetenango, fide Tejada); *Quisis* (Quiché, fide Tejada); *Chinchac*; *Paxaque*; *Ksis* (Volcán de Santa María, Quezaltenango). Figure 5.

Native probably at about 2200-3300 meters, but widely planted and naturalized, and sometimes appearing native at considerably lower elevations; the following departments are those in which the tree probably is native: El Progreso (Sierra de las Minas); said to grow in Jalapa in region of La Soledad; Chimaltenango; Quiché (?); Totonicapán; Quezaltenango; San Marcos; to be seen in cultivation or naturalized in all the departments. Central and southern Mexico.



A giant tree when well grown, sometimes 30 meters high or more, with a large or small, broad or columnar crown, the bark shredded and often separating in long narrow strips, reddish brown; branches in the common form spreading, often with somewhat refracted tips and pendulous branchlets, the smaller branchlets irregularly branched, slightly compressed; leaves closely imbricate, dull or dark green to glaucescent, 4-ranked, 1–2 mm. long, ovate, acute, appressed, with a dorsal glandular pit; cones pedunculate, globose, covered with a pale bloom, 12–15 mm. in diameter; scales 6–8, terminated by an elongate, pointed, and usually curved mucro; seeds yellowish.

A few varieties or forms of this species have been described, but they are based either on herbarium specimens or on plants cultivated abroad, and apparently are of the very slightest importance and have no relationship with the rather obvious forms recognizable in the wild trees—forms so distinct that they are given distinctive names by the Indians. Of the named forms one is *C. lusitanica* var. *Benthamii* (Endl.) Carrière, described as a pyramidal tree, the branchlets regularly pinnate-branched and disposed in one plane, the smallest branchlets slightly compressed. *C. lusitanica* var. *Knightiana* (Knight & Perry) Rehder is said to be similar to var. *Benthamii*, but the branchlets are still more compressed and very regularly and evenly pinnate-branched.

There are two conspicuous local variations that are of horticultural importance, at least in Guatemala, and they are easily recognizable in the field although not in herbarium specimens. The first of these is the local weeping cypress or “ciprés llorón.” In this the ultimate divisions of the branches, at least the lower ones, are very long and slender and laxly pendent, after the manner of the weeping willow (*Salix babylonica*), although on a much less exaggerated scale. We have not noted this form in the forest, but many trees are planted for ornament through the mountain regions, as, for example, about Antigua, where the trees are highly esteemed.

The most conspicuous and distinctive variant of *Cupressus lusitanica* is the so-called *ciprés romano* (“Roman cypress”) for which the Occidente and particularly the city of Quezaltenango are noted. In this the crown of the tree is very long and narrow and of columnar form, looking exactly like the celebrated cypresses that dominate many Italian landscapes. In the wild state the columnar form seems to be confined to the mountains near Quezaltenango, and perhaps wholly to the Volcano of Santa María. On the upper slopes of this peak, in spite of the unfavorable loose sandy soil that has a marked tendency to slide to the foot of the mountain, cypress trees are plentiful, although not (where we have seen them) forming dense forests. Here the two forms, with broad and with columnar crowns, both



FIG. 5. *Cupressus lusitanica*. a, Cone ( $\times 1$ ). b, c, Seed (slightly enlarged). d, Habit of fruiting branch ( $\times \frac{1}{2}$ ). e, Habit of leafy branch ( $\times \frac{1}{2}$ ).

grow, sometimes together and sometimes apart. Standing on some eminence near the base of the volcano one may look upward and map the distribution at a glance. It is believed that both the columnar and weeping cypresses come true from seed; at least this is the local belief.

The native cypress forests of Guatemala are very fine and beautiful, but they are being none too gradually destroyed. The best stand of lumber is or was that on the Cerro de Tecpám in Chimaltenango, but this has been greatly depleted by lumbering operations, being on privately owned ground. The large trees left here are magnificent, the trunks very thick and tall, and often covered with great masses of soft green mosses as large as sofa cushions. The next best, and perhaps even more beautiful stands, are in San Marcos and adjacent Quezaltenango. Those along the road above Ostuncalco are especially handsome—the trees relatively young, but close together, and the trunks consequently very tall, slender, and straight. The cypress usually but not always is associated with *Pinus Ayacahuite* and *Abies*. Very few smaller plants are able to thrive in the denser forest, where but little light reaches the ground. In favorable places the trees seed profusely and seedlings are abundant. Many of the young plants doubtless are destroyed by the ever-present sheep. The senior author once was amazed when walking along the border of one of these mixed cypress-fir forests between San Francisco El Alto and Momostenango, to lift his eyes and see grazing there a small flock of llamas. It had the appearance of a hallucination, until it was remembered that the government of Peru some time previously had presented these animals to Guatemala, and an attempt was being made to acclimatize them here.

It is not possible, except by inference, at the present time to determine the original distribution of cypress in Guatemala. The trees are seen in practically every settled part of the country, in the lowlands only as isolated trees in parks or about houses, but at 1300 meters or higher often in great groves that from a distance appear to be native, until closer inspection reveals that the trees are planted in rows. It may well have been that before any of the land was cleared, long before the Conquest, cypress covered most of the moister mountains above about 2200 meters, but this is purely guesswork. There can be no doubt that the forests were formerly much more extensive than today. This tree has been highly recommended by Wilson Popenoe and others for use in reforestation in tropical America. The practicability of this is proved by the fact that in Guatemala it has been so used for probably several generations. The tree shows extraordi-



nary adaptability to climatic conditions, and in the parks it grows luxuriantly and rapidly, almost if not quite down to sea level. In recent years it has been much planted under government direction, in a laudable attempt to foster tree planting on all available land not used for ordinary crops.

The native cypress is highly esteemed for ornamental planting, and there are numerous fine plantings of the trees in scattered places. One of the most imposing is the majestic avenue of great trees bordering the entrance to San Marcos from the south, and other avenues perhaps quite as fine are seen about Chimaltenango. Perfect trees of the *romano* type may be seen about Antigua, as in front of the historic church of La Merced. The cypress makes excellent hedges and is much planted for this purpose. The hedges may be trimmed to any height and become very dense by continued pruning. About Quezaltenango and other cities there are striking examples of the topiarist's "art"—the trees trimmed in the forms of peacocks and other animals. Among the historic trees of Guatemala is the famous tree, now dead but still standing in 1941 at least, at Concepción Chiquirichapa, near Quezaltenango, under which Pedro de Alvarado and his men are said to have rested before passing on to the conquest of what is now Quezaltenango. Its trunk is almost 12 meters in circumference, but only the snagged stubs of a few of the old branches remain.

Cypress lumber is highly esteemed in Guatemala for construction purposes, and the trees still are being cut. It is stated that the wood is used commonly for the sounding boards of guitars and mandolins. The young branches are used in great quantities for decorations during all the fiestas, and they are employed in large amounts for making *coronas* or wreaths for cemeteries. While the pines of Guatemala have been reduced by fungus and insect pests, the cypress seems resistant to such enemies. In some places the branches are much deformed by a rust that produces growths similar to cedar apples, but trees so infested seem to suffer but little damage.

The specific name *lusitanica* ("Portuguese") for this tree is an unfortunate and misleading one. Seeds were supposedly taken from Mexico by Spanish friars, and reached Portugal, where the tree was grown and dispersed to other parts of Europe, receiving finally the name *Cupressus lusitanica* because it was believed to have originated in Portugal. Professor Martínez, in his work on "Los Cupressus de México" (Anal. Inst. Biol. Mex. 18: 71-149. 1947) treats the material from Guatemala under the name of *C. Lindleyi* Klotzsch, applying that name likewise to a great mass of Mexican material, at the



same time differentiating *C. Benthamii* Endl. as a less commonly distributed Mexican species confined to the states of Hidalgo, Veracruz, and Puebla. Since he cannot match any material originating from Mexico with that sent by Dr. Melo de Figueiredo from what is considered to be the first tree of *C. lusitanica* cultivated in Bussaco, Portugal, he concludes that *C. lusitanica* cannot be native to Mexico (loc. cit. 89–90). Moreover, he retains *C. lusitanica* as distinct from both *C. Lindleyi* and *C. Benthamii*, distinguishing them by what he considers to be good differences (see pp. 98 and 104). Inasmuch as there exists considerable variation in wild and cultivated specimens of Guatemalan *Cupressus* and in what would pass as similar or identical material from Mexico, not only in shape of tree, position and thickness of branches, size of fruits, but also in other details, it is not surprising that various authors have reached different conclusions regarding the disposition of the variations encountered. The differences mentioned by Martínez (loc. cit.) for separating these three names do not appear justified in our opinion, as there is considerable variation and overlapping of characters used. As *C. lusitanica* is the oldest name used for what we consider to represent a complex taxon present in Guatemala and Mexico, it seems advisable, as some other authors have done, to adopt its usage as the conservative course of procedure, instead of disregarding it completely.

### JUNIPERUS L. Red Cedar; Juniper

Evergreen aromatic trees or shrubs, sometimes low or even prostrate, most often with thin shredded bark, the branchlets spreading, ascending, or irregular, the secondary branchlets produced on all sides of the primary ones; leaves small, opposite or ternate, either acicular and somewhat spreading or scale-like and appressed, the needle-like leaves in whorls of 4, with bluish or whitish lines on the upper surface, the scale-like leaves in 3–4 rows, both kinds of leaves often found on the same plant at different stages of development; flowers dioecious or monoecious; staminate catkins small, ovoid or oblong, terminal or in the leaf axils, the flowers yellow, consisting of numerous, opposite or ternate, 1-celled anthers; pistillate flowers minute, globose, greenish, composed of 3–8-pointed fleshy scales or bracts, some or all of these bearing 1–2 ovules within, the fruit finally becoming fleshy and berry-like, with a strong resinous odor, usually maturing the second year but sometimes the first or third year; seeds generally 1–6, usually ovoid, terete or angulate, often sulcate, brown or buff, with a conspicuous hilum at the base.

About 40 species, in the northern hemisphere, chiefly in temperate regions, in the tropics usually confined to the mountains. The following are the southernmost American species. The wood in this genus is brown to reddish or purplish, with a strong and pleasant fragrance; very fine and of uniform texture, firm and fairly hard,

easy to cut in any direction, holds its place well when manufactured, and is highly resistant to decay. In the United States cedar wood is used principally for making lead pencils, for which purpose no satisfactory substitute has been found. It is utilized also for making chests in which woollen goods are stored, since it is repellent to clothes moths and other insects. Little or no use is made of the cedar wood in Guatemala except for firewood. The volatile oil of the berries distilled with spirits is a beverage, gin, in Spanish *ginebra*, both words derived from the geographic name Geneva (*Ginebra* in Spanish). A decoction of the leaves of various species has been used as a teniafuge and abortifacient, but its use is dangerous. The bark is rich in tannin and is sometimes utilized for tanning leather.

Adult scale-like leaves acute, mucronate, 1–1.3 mm. long; superficial epidermal cells very fine and numerous under a microscope; margins of the scale-like leaves conspicuously erose-denticulate; fruit 1-seeded or rarely 2-seeded; seeds large, 8 mm. long, firmly attached to the pericarp . . . . . *J. comitana*

Adult scale-like leaves cucullate-rounded or obtuse at the apex, not mucronate; superficial epidermal cells relatively larger and fewer when seen under a microscope; margins of the leaves minutely erose to subentire; seeds only 4–5 mm. long, easily separating from the pericarp . . . . . *J. Standleyi*

***Juniperus comitana*** Martínez, Anal. Inst. Biol. Mexico 15: 12. f. 5–8. 1944. *Sicop, Cipres* (Baja Verapaz).

Mostly on rather dry and open, rocky hillsides, 1200–2150 meters; Baja Verapaz (region of Santa Rosa); Zacapa (Sierra de las Minas); Huehuetenango. Chiapas (the type from Comitán).

A large shrub or a tree, seldom more than 12 meters high, the bark shredded, separating into tough, reddish brown strips or long scales; branchlets slender, 4-sided, separated from one another, 0.8–1 mm. thick, the ultimate ones 1.5–2 cm. long; adult leaves scale-like, ovate, acute, mucronate, bright green, 1–1.3 mm. long, dorsally depressed at the middle and glandular or eglandular, the margins conspicuously erose-denticulate, the apex and margins paler than the rest of the leaf; needle-like leaves subulate or linear-subulate, 5–11 mm. long, 0.8–1 mm. wide; fruit containing 1 or rarely 2 seeds, bluish, glaucous, with thin sweet resinous flesh, 9–10 mm. long, 5–8 mm. broad.

This tree is very local in Guatemala. In general appearance as well as in habit of growth it is conspicuously different from *J. tetragona*, usually occurring as an isolated tree with rather open crown. Even the smaller plants are strictly erect. Indians questioned in Baja Verapaz insisted that the tree was the common *Cupressus* of Guatemala, but the fruits of *Juniperus* and *Cupressus* are quite unlike.

***Juniperus Standleyi*** Steyermark in Standl. & Steyerm. Field Mus. Bot. 23: 3. 1943 (type from upper slopes of Volcán de Tacaná,

San Marcos, *Steiermark 36137*). *Huitun* (Huehuetenango; accent on the first syllable); *Huitó* (Huehuetenango); *Ciprés*. Figure 6.

High mountains, often on limestone, 3000–4100 meters; Huehuetenango (Sierra de los Cuchumatanes; mostly at high elevations, but sometimes at lower altitudes); San Marcos (near summit of Volcán de Tacaná). Chiapas (Volcán Tacaná).

Plants sometimes prostrate and forming mats only 30 cm. high, or often low broad spreading shrubs about a meter high, becoming trees as much as 15 meters high and then often forming dense forests; branches reddish brown, the ultimate branchlets with scale-like leaves often excessively numerous, dense, and crowded, mostly 1.1–1.4 mm. thick and 5–20 mm. long; adult leaves scale-like, ovate or rounded-ovate, rounded or obtuse and somewhat cucullate at the apex, deep green, 1.5–1.7 mm. long, depressed at the middle, glandular dorsally, the margins thick, incurved, minutely erose or subentire, the tip and upper margins the same color as the rest of the leaf; needle-like leaves lance-subulate, acuminate, 4–5 mm. long, 1.5–1.7 mm. wide at the base; fruit containing 3–4 seeds, bluish green or bluish, 7–9 mm. in diameter, solitary on a short curved pendulous pedicel.

This cedar is found most abundantly and almost exclusively at high elevations, 3000 meters or higher. On the Volcán de Tacaná it is confined to moist ravines or shaded rocky slopes toward the summit, where most of the plants are prostrate or nearly so. In the Cuchumatanes the tree is abundant, and perhaps the most distinctive tree of high elevations, forming there small or large groves of very dense growth, frequently on rough limestone slopes where there is but little soil. These forests are so dense and there are so many dead branches on the ground that frequently it is difficult to make one's way through them. Perhaps because of the cold and fog prevailing in these places, the forests have a forbidding aspect which is enhanced by the many dead gnarled trees with jagged whitish branches stripped of bark, the many gray lichens clinging to the branches, and the numerous ravens that perch in the trees, croaking as if in pain. In such dense forests the little other vegetation consists chiefly of straggling shrubs of *Mahonia*, *Holodiscus*, and *Rubus trilobus*. Most of the cedar trees in the Cuchumatanes are gnarled, and few are of symmetrical growth. They vary in shape but most have low, broad, rather depressed crowns. The branches often have conspicuous knots and also long fusiform swellings as thick as a man's arm, doubtless caused by some *Gymnosporangium* or similar rust. In open places about the denser forest the cedar often grows as a low, depressed and spreading but not prostrate shrub, a meter high or somewhat lower. The trees were in bloom in the Cuchumatanes at the end of December, shedding clouds of pollen when the branches were shaken.





FIG. 6. *Juniperus Standleyi*. a, Seed, ventral view ( $\times 5$ ). b, Seed, lateral view ( $\times 5$ ). c, Pistillate flowers on tip of branchlet ( $\times 2$ ). d, Staminate catkins on end of branchlet ( $\times 3$ ). e, Habit of fruiting branch ( $\times \frac{1}{2}$ ).

### THUJA L. Arbor-vitae

Evergreen aromatic monoecious trees or shrubs with spreading, erect, or pendent branches, the crown usually pyramidal, the bark thin, irregularly scaly; branchlets compressed, disposed in one plane, pinnately branched, the smaller ones deciduous; leaves on young plants needle-like and spirally arranged, the normal adult leaves small, scale-like, imbricate in 4 rows, decussate, appressed, sometimes dorsally glandular; flowers small, terminal, on short branchlets; staminate flowers ovoid, yellow, the 6-12 decussate stamens each with 2-4 anther cells; pistillate flowers consisting of 8-12 scales in opposite pairs, only the middle or lower scales fertile, each of the fertile scales with basilar ovules within; cones globose-ovoid to oval-oblong, the scales with a thickened ridge or umbo at the apex; seeds 2 under each scale, thin, with broad lateral wings, or thick and wingless; cotyledons 2.

Six species, 2 in North America, 4 in eastern Asia, in temperate regions.



***Thuja orientalis* L. Sp. Pl. 1002. 1753. *Ciprés; Incienso.***

Native of eastern Asia, often planted for ornament in Guatemala.

A shrub or a small symmetrical tree, the branches slender, ascending or pendent, the bark reddish brown; leaves of the main axis with a free, somewhat spreading apex, those of the lateral branchlets closely appressed, rhombic-ovate, acute, bright green, with a narrow linear-elliptic gland in the center dorsally; cones globose-ovoid, 1.2–2.5 cm. long, somewhat fleshy and bluish before maturity; scales usually 6, ovate, the uppermost pair sterile, each with a horn-like mucro near the apex; seeds ovoid, brown.

Most of the plants seen in Guatemala are mere shrubs, but sometimes small trees may be found. They resemble the cypress but are distinguished by their flattened branchlets. Some of the named varieties and forms are represented locally, distinguished by slender drooping branches, golden foliage, and other characters.

**PINACEAE. Pine Family**

Usually large trees, the leaves persistent, resinous, spirally arranged, solitary or fasciculate; flowers naked, usually monoecious, subtended by scales; stamens numerous, the sporangia 2, on the lower side of the scale; pistillate flowers with numerous, spirally arranged scales, these free or sometimes connate; fruit a cone, usually woody, closed until maturity or later, composed of the much thickened and indurate scales; seeds usually winged along one margin; embryo with several cotyledons.

Nine genera are known, the rather numerous species almost all in the northern hemisphere. Only the following genera are native in Central America but four others are native in North America, and three of them, *Pseudotsuga*, *Tsuga*, and *Picea*, extend into Mexico. Besides the genera discussed below, a species of *Larix*, perhaps the European *L. decidua* Miller, has been observed in cultivation in Guatemala City. The species of *Larix* (in English, larch) resemble the pines in their leaves, but the leaves are soft and deciduous. There is in cultivation also in Guatemala City, in the Parque Central and probably elsewhere, the Norway spruce, *Picea Abies* (L.) Karsten, native of northern and central Europe, a tree highly esteemed for ornamental purposes in the United States.

Leaves solitary, not subtended by a basal sheath; scales separating from the axis of the cone at maturity.....*Abies*

Leaves fasciculate, the fascicle subtended by a sheath; cone scales persistent on the axis at maturity.....*Pinus*

**ABIES Miller. Fir**

*Reference:* Alfred Rehder, The firs of Mexico and Guatemala, Journ. Arnold Arb. 20: 281–287. 1939.

Usually large, evergreen trees, symmetrical in growth, the crown pyramidal or conic-oblong, the branches spreading, whorled; trunk straight, the bark smooth and thin on younger trees, in age becoming thick and furrowed at the base; winter buds with or without resin; leaves spirally arranged but because of a basal twist usually spreading and 2-ranked, persistent on dried branches, linear, flat and sulcate above, beneath usually with 2 white stomatiferous bands, sessile, contracted above the base, leaving a circular scar when fallen, with 2 (in Guatemalan species) or rarely 4-8, marginal or median resin canals, and with usually 2 vascular bundles; aments axillary, appearing in early spring from buds formed the previous season on branchlets of the year, surrounded by involucre of the enlarged scales of the flower buds; staminate catkins pendent on branches above the middle of the tree, oval to cylindric-oblong, the anthers yellow or scarlet; pistillate catkins globose, ovoid, or oblong, erect on the uppermost branches, the scales numerous, 2-ovulate, imbricate; cones erect, ovoid to oblong-cylindric; cone scales closely imbricate, thin and coriaceous, incurved and broad or truncate at the apex, narrowed at the base into a long stipe and subtended by narrow, exserted or enclosed bracts, the scales falling at maturity from the persistent axis; seeds ovoid or oblong, with large thin wings; cotyledons 4-10.

About 40 species in temperate regions of the northern hemisphere, in America ranging southward to Guatemala, in the Old World to northern Africa and the Himalayas. The genus includes some of the stateliest and handsomest of all the conifers. The wood is almost colorless to brown with a reddish or pinkish tinge, of medium luster, very light, soft, and weak to moderately heavy, hard, and strong.

***Abies guatemalensis*** Rehder, Journ. Arnold Arb. 20: 285. f. 1, j-m. 1939. *A. tacanensis* Lundell, Amer. Midl. Nat. 23: 175. 1940 (type from Volcán de Tacaná, Chiapas); *A. guatemalensis* var. *tacanensis* (Lundell) Martínez, Anal. Inst. Biol. Mexico 19: 70-73. f. 51-52. 1948. *Pinabete*. Figure 7.

Moist or wet forests of the high mountains, mostly at 2700-3500 meters; Quiché (Cerro María Tecún); Totonicapán (Cumbre del Aire; region of Desconsuelo and between San Francisco El Alto and Momostenango); Huehuetenango (type from Cumbre del Aire, *J. H. Faull 13104*, perhaps rather in Totonicapán; Sierra de los Cuchumatanes, at Chancol, region of San Mateo Ixtatán, and elsewhere); Quezaltenango (Volcán de Zunil; mountains southeast of Palestina); San Marcos (volcanoes of Tajumulco and Tacaná; region of Serchil). Chiapas (Volcán de Tacaná), Oaxaca, and Guerrero.

A tree as much as 45 meters high with a trunk almost a meter in diameter, or perhaps even larger, the branches dark or grayish brown, the young twigs rufous-brown or castaneous, sparsely hirtellous near the apex; leaves appearing 2-ranked, spreading-ascending or almost divaricate, linear, 1-4.5 cm. long, 1-2 mm. wide, obtuse and usually emarginate at the apex, lustrous and dark or rather light green above, usually silvery beneath, the upper surface sulcate for all or most of its

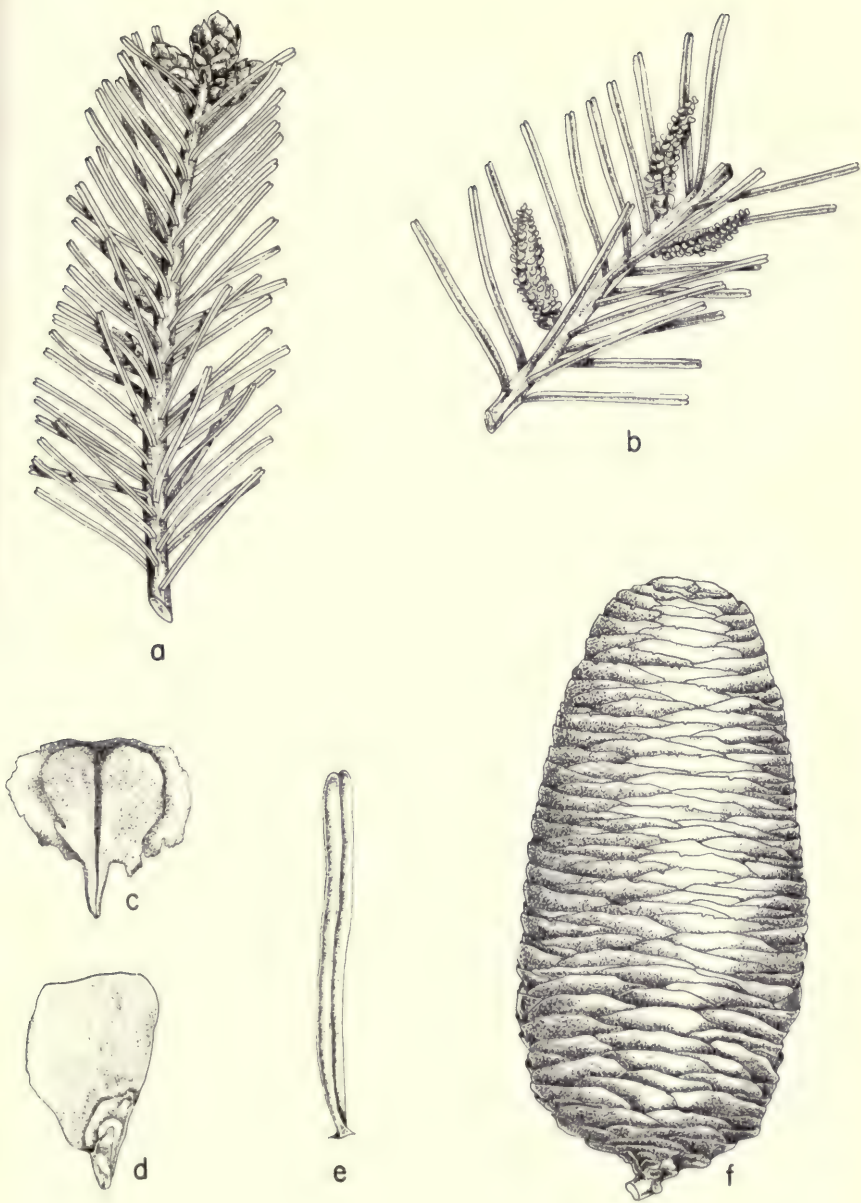
length, the costa elevated beneath, the margins recurved, the stomata conspicuous beneath; resin canals 2, subepidermal, the hypoderm well developed, interrupted; fibrovascular bundles 2, approximate but distinct; cones sessile, 8.5–11.5 cm. long, 4.5–5 cm. in diameter; bracts cuneate-obovate or oblanceolate, half as long as the scales or somewhat exceeding them; broadly rounded or truncate and erose-denticulate at the apex, the cusp usually exserted; scales broadly cuneate-obovate or transverse-oblong, 2.7–3 cm. wide, 1.5–2.2 cm. high, the margins hirtellous-puberulent outside; seed cuneate-obovoid, 8–10 mm. long, pale brown, the wings obovate, 1–1.5 cm. long, 1.4–1.5 mm. wide.

Until recently the Guatemalan fir was confused with the Mexican *A. religiosa* (HBK.) Schlecht. & Cham., which received its specific name because the branches were used as decorations in churches. *A. tacanensis* of Volcán de Tacaná was supposed to be distinguished from *A. guatemalensis* by its narrower, more crowded leaves with margins rounded in cross section, the upper leaf surface sulcate only in the lower two-thirds, and the longer bracts of the cones. Martínez (Anal. Inst. Biol. Mexico 19: 70–73. 1948) has attempted to retain *A. tacanensis* as a variety of *A. guatemalensis* on the basis of leaf, cone, and scale measurements, differences in apex of leaves and wings of the seeds, and internal structure of the leaves. However, the ample Guatemalan material now available varies in all these characters, and many of the variations may be found on the same tree.

The fir is one of the outstanding trees of Guatemala, although of local distribution, dependent in large part upon its altitudinal requirements. It is abundant in some localities, where it forms dense and handsome forests of limited extent, usually in association with *Pinus Ayacahuite* and *Cupressus*. Occasionally, as at the type locality, the trees are spaced, and sometimes isolated. It is somewhat surprising that the tree was not practically exterminated long ago, and its persistence at present is largely a result of the fact that most of the best stands are on national lands, where their cutting is prohibited. The best forests are so dense that little vegetation is found on the ground beneath the trees—only a few low shrubs of rather weak growth, mosses, and a limited number of herbs. The trees are very rarely planted in parks and *fincas*, as in the hotel patio at Sololá. Some are said to be planted in the region of Cobán but we have not seen them, and the climate there probably would not agree with them. In their native habitat the trees do not reproduce very freely, but some young plants are found. The isolated trees at Cumbre del Aire have been found repeatedly loaded with cones, but the constant grazing by sheep probably destroys the seedlings.

Because of its scarcity, no lumber of this tree is available in Guatemala, except on rare occasions. It is stated, however, that the wood





S.H. Grove

FIG. 7. *Abies guatemalensis*. *a*, Apex of leafy branch ( $\times 1$ ). *b*, Portion of branch with staminate catkins ( $\times 1$ ). *c*, Cone scale, inner side ( $\times 1$ ). *d*, Seed ( $\times 1\frac{1}{2}$ ). *e*, Needle, lower side ( $\times 1\frac{1}{2}$ ). *f*, Cone ( $\times 1$ ).



is in demand for making the hand looms on which the beautiful Indian textiles are woven. The branches often are cut in the mountains to make *ramadas* or temporary shelters. The principal use of the tree, however, is for decorative purposes. The branches are much used, when available, as decorations in churches and dwellings, and substantial quantities of them are available, probably cut surreptitiously on government land. Since this is the only native tree that affords Christmas trees similar to the best ones of Europe and the United States, the small trees are much in demand for this purpose among the foreign residents. Fine Christmas trees were observed on sale in Huehuetenango for as little as twelve cents, while in Guatemala, to which they must be carried for long distances, they usually cost five dollars or more.

### PINUS L. Pine

*References:* G. R. Shaw, The pines of Mexico, pp. 1-29, *pls. 1-22*. 1909; The genus *Pinus*, Publ. Arnold Arb. 5, pp. 1-96. 1914. M. Martínez, Las pinaceas mexicanas, Anal. Inst. Biol. Mexico, 345 pp. 1945; Los pinos mexicanos, ed. 2. 1948. E. E. M. Loock, The pines of Mexico and British Honduras, in Union of South Africa Dept. For. Bull. 35. 244 pp. 1950.

Evergreen trees or rarely shrubs, the branches whorled, spreading, the bark furrowed, broken into plates or sometimes rather smooth; buds covered with imbricate, more or less resinous scales; leaves and branchlets of two kinds, the inconspicuous primary leaves arranged on long shoots and usually reduced to small scarious bracts, the conspicuous green secondary leaves arising in the axils of the primary leaves or bracts on short undeveloped shoots or branches; leaves in clusters of 2-6 (rarely solitary), semiterete or trigonous in cross section, much elongate, slender, needle-like, the cluster surrounded at the base by a thin colored sheath composed of 8-12 bud scales, the sheath often deciduous; flowers monoecious, in yellow, orange, or scarlet, catkin-like clusters at the ends of the old shoots or at the bases of the young ones, composed of many spirally arranged, 2-celled anthers; pistillate flowers lateral or subterminal, in short, dense, greenish or purplish spikes, these composed of numerous, spirally arranged, 2-ovulate scales, each scale subtended by a small bract; cones maturing at the end of the second or third season, subglobose to long-cylindric, symmetric or asymmetric, the woody scales appressed and closed before maturity; apex of the scale usually much thickened, the exposed part (apophysis) generally rhombic in outline, transversely carinate and usually with a prominent umbo, this sometimes ending in a spine or prickle; seeds small or large and nut-like, with or without a wing; cotyledons 4-15.

About 65 species, all in the northern hemisphere except for one or more that extend into the Malayan Archipelago. Only the following are found in Central America, but many others are native in Mexico and the United States. Most of the tropical pines are con-

fined to mountain regions, but sometimes they descend to sea level. Several exotic pines are planted for ornament in Guatemala, one of them being (in the Jardín Botánico at least) *Pinus halepensis* Miller, native of southern Europe and western Asia, the Aleppo pine.

Pine trees are of the highest economic importance, being the most important source of lumber and resin of all trees. In Guatemala they are also the most important single source of lumber, and are used for almost every purpose for which wood can be utilized. Some of the lumber is sawed in sawmills, and much is sawed by hand. In the latter case the log usually is placed over a shallow pit, and two men, one above and one below, manipulate a cross-cut saw, painfully working out large boards. One must admire the skill of these workmen, who obtain wide boards almost as uniform in thickness as those obtained by more modern processes. The rough boards often are transported for long distances up and down the mountains upon men's backs, or more often dragged along the ground, a task in which women and girls sometimes engage, as we have seen them in the mountains between Totonicapán and Quezaltenango.

Pine wood also is an important firewood in Guatemala, although not a very good one. It is used generally only when better fuel is not available. In the rural regions, especially among the Indians, a pine torch is often used for illumination along the roads and trails or even in the houses, where its cheapness is an important factor in its use. Small billets of fat pine or *ocote* are sold in all the small supply shops for lighting fires, especially charcoal; it is amusing to watch women and children, before they make a purchase, inspecting each item of the stock with almost as much care as if they were buying a new garment. Some resin and turpentine are doubtless gathered in Guatemala, but we have no reliable information regarding this subject.

The two most abundant and characteristic trees of Guatemala as a whole are pines and oaks, and these often form mixed forests. Frequently, however, the pines form beautiful pure stands of great extent. One of the pines, *P. caribaea*, is isolated in the lowlands of the Atlantic coast. Of the white pines, *P. Ayacahuite* is found only at high elevations, usually associated with *Abies* and *Cupressus*, whereas the southern variety of the white pine of the eastern United States, *P. Strobis* var. *chiapensis*, occurs in moist forests at lower and middle elevations of the Sierra de los Cuchumatanes in the departments of Quiché and Huehuetenango. The other three are much alike in their characters, widely distributed at middle elevations or sometimes at rather high ones. Taken together they form a distinc-

tive group, all three species much alike in their habits and habitats, and not easily separable in either the field or the herbarium. These three cover or formerly covered most of Guatemala lying at middle elevations, except in the more humid areas like the Pacific slopes of the volcanoes, where a mixed forest of broad-leafed trees prevails. There are still very extensive pine forests in Guatemala, some of them much over-grazed by cattle and sheep, and much of them consisting only of small trees. Where transportation is poorer than usual, handsome stands of large trees may be found, as in the mountains of Baja Verapaz. A vast part of Guatemala that once must have been covered with pine forest is now under cultivation, and some of it has been for centuries. At the present time the pine forests are suffering severely not only from inroads made by man but even more from the attacks of insect and fungus pests. In almost every part of Guatemala one sees hundreds of acres or many square miles of land where practically all the pine trees are dead but still standing. It is impossible to believe that the disease situation always has been so bad as at present, for if it had been, the forests certainly would have been destroyed long ago. These pests have been studied at least superficially, and have been found to be numerous—various kinds of fungi and several insects of different groups. The most striking disease attacking the pines is the so-called big-cone disease, which is well known also in Mexico. In Guatemala this is caused by the larvae of a moth. Pine cones in which the larvae develop are malformed and attain several times their normal size. About Cobán after a heavy rain one sees pine trees (*Pinus oocarpa*) loaded with golden-yellow cones, as if they had been freshly gilded. This appearance is caused by the great masses of spores of a rust fungus.

Especially in the central region one frequently sees pine trees that are abnormal in appearance, the tall slender trunks naked except at the top, where there is only a small tassel-like crown. The branches have been cut for use as decorations for fiestas and celebrations. On festive occasions it is customary, a custom doubtless dating back to preconquest times, to cover the floors and even sometimes the streets with fresh green pine needles. More than that, the fresh branches are used for adorning walls of houses, outside and inside, for decorating altars, and for making the characteristic arches across roads and streets. Pine branches are a ceremonial offering by the mountain Indians to roadside crosses and shrines, and Sapper believes that they must have been offered likewise to the ancient pagan gods. He states that in parts of Alta Verapaz where pine trees do not grow naturally they are planted, so that branches may be available for this purpose.



A more prosaic use for pine needles is their addition to adobe bricks, where they serve the same purpose as cereal straw.

Pine trees often are planted for ornament or with an eye to their use for lumber in almost all the mountain regions of Guatemala. The cutting of seedlings or small trees is punishable by a severe fine, a punishment that has often been inflicted in recent times. The term *ocote*, which is applied to fat pine slivers, is derived from the Nahuatl *ocotl*, the Nahuatl term for pine tree. A pine of the Lacandón region, probably *P. caribaea*, is said to be called "tote" by the Lacandones. Other Indian names of Guatemala applied to pine trees, probably to all species without discrimination are "chaj" (Huehuetenango); "titzlum" (Huehuetenango); "chaj" (Totonicapán). The following names are used in the Guatemalan languages indicated: "chaaj" (Quiché); "tax," "caxta" (Jacalteca); "taj" (Maya of Petén); "tajté" (Tzental); "sacal taj" (Chol); "tiatié" (Quecchí); "chaj" (Pocomchí); "tza" (Aguateca); "tzaj" (Mame); "teccamanil" (San Marcos). "Chajul" is a Quiché word signifying a pine billet used as a torch.

Some of the Mexican pines produce edible seeds or *piñones* that are very good to eat, especially when roasted. It is said that the Mexican nut pines, presumably *Pinus cembroides* Zucc., have been planted at a few places in the Occidente of Guatemala. *Piñones* imported from Mexico are offered for sale here, but at high prices.

Leaf sheaths deciduous; mature leaves silvery or whitish on one side; cone scales with the umbo terminal and unarmed; bark of mature trees relatively smooth or slightly furrowed.

Apophysis of cone scale elongated and reflexed; cones 15 cm. or more long, usually 3-5 times as long as broad; resin ducts 2-6; at elevations of 2000-4000 meters, widely distributed in Guatemala. . . . . *P. Ayacahuite*

Apophysis of cone scale not elongated, broadly rounded at apex; cones less than 15 cm. long, usually 2-2½ times as long as broad; resin ducts usually 3; at elevations of 800-1800, rarely 2000 meters, rare in departments of Quiché and Huehuetenango. . . . . *P. Strobis* var. *chiapensis*

Leaf sheaths persistent in age; mature leaves green on all sides; cone scales with the umbo dorsal, generally with a prickle or sharp-pointed process; bark of mature trees strongly furrowed or broken into plates.

Leaves in fascicles usually of 3; young shoots multinodal; trees of low elevations, at 600 meters or lower; resin ducts of the leaves internal, i.e., touching the endoderm. . . . . *P. caribaea*

Leaves in fascicles usually of 5-6, sometimes in 4's; trees of the higher mountains, usually at 1500 meters or higher; resin ducts of the leaves medial or septal.

Branches of young trees and upper part of stem smooth, not covered with rough scales, the base of the scales not prominent and more or less submerged in the wood; leaves slender, 0.6-1 mm. broad, often pendent, curving, or laxly spreading; resin ducts medial, i.e., not touching the hypoderm or endoderm. . . . . *P. pseudostrobis*



Branches of young trees and upper part of stem rough, covered with rough or persistent scales or their prominent bases; leaves stout, stiffer and more rigid, 1-1.5 mm. broad, erect; resin ducts septal or medial.

Cones borne on peduncles as much as 3.5 cm. long, long-persistent and late in opening, usually broadly ovoid or ovoid-conic, generally only 1.2-1.7 times as long as broad; resin ducts septal, i.e., touching both the hypoderm and endoderm.....*P. oocarpa*

Cones sessile, opening at maturity and deciduous, conic-oblong to conic, usually 2-3 (sometimes 5) times as long as broad; resin ducts medial, i.e., not touching the hypoderm or endoderm.

Trees with relatively long leaves and cones; leaves 15-45 cm. long.

*P. Montezumae*

Trees with relatively short leaves and cones; leaves 7-15 cm. long.

*P. Montezumae* var. *rudis*

**Pinus Ayacahuite** Ehrenberg, Linnaea 12: 492. 1838. *Pino*; *Pino dulce*; *Pachá* (Volcán de Santa María, Quezaltenango). Figure 8.

Usually in moist mountains at high elevations, generally associated with *Abies* or *Cupressus* or both, and often with broad-leaved trees, 2000-3300 meters or perhaps even higher; El Progreso (Sierra de las Minas); Zacapa (Sierra de las Minas); Jalapa (Montaña Miramundo); Guatemala (Volcán de Pacaya); Quiché (Cerro María Tecún); Huehuetenango; Totonicapán; Quezaltenango; San Marcos. Widely distributed in Mexico.

A large tree, sometimes 50 meters high with a trunk almost 2 meters in diameter, the trunk often very tall and clean, the bark grayish white and smooth on young trees, on older trees becoming pale brownish or copper-brown and broken into shallow 4-angulate thin plates; young shoots uninodal; youngest branchlets slender, 4-8 mm. thick, rather smooth, grayish or light brown; leaves 5 in a fascicle, pale or grayish green above, silvery or whitish beneath, 5.5-22 cm. long, 0.6-1 mm. thick, flexible, somewhat serrulate, the stomata ventral only, the resin ducts external, the fibro-vascular bundle only 1; leaf sheaths soon deciduous; cones long-cylindric, gradually narrowed to the apex, pendent from long stalks, 22-45 cm. long, 4-10 cm. thick, yellowish or reddish brown, dull to somewhat lustrous; cone scales prolonged, spreading and reflexed in age, relatively thin and flattened, the umbo terminal; seeds gray-brown, mottled with dark brown, with a well-developed wing 3-3.7 cm. long and 8 mm. wide.

This is the handsomest and most attractive of the pines of Guatemala, often attaining a great height at high elevations, with a very tall, clean trunk frequently a meter or more in diameter. In some places, such as the slopes above Fuentes Georginas in Quezaltenango, it grows in the rather dense forest of broad-leaved trees, where it is conspicuous because of its unique foliage that glistens in the sunlight. This is one of the easily recognized Guatemalan pines, because of the deciduous leaf sheaths, and especially on account of the unique cones,



FIG. 8. *Pinus Ayacahuite*. a, Leafy branch ( $\times \frac{1}{2}$ ). b, Cone ( $\times \frac{1}{3}$ ).

long and narrow with recurved cone scales and of very handsome appearance.

***Pinus caribaea*** Morelet, Rev. Hort. Côte d'Or 1: 105. 1851. *P. hondurensis* Loock, Union of South Africa Dept. For. Bull. 35: 205–214. 1950, homonym of *P. hondurensis* Sénéclauze, Conif. 126. 1867. *Pino*; *Pino blanco*; *Pino colorado*; *Pino de ocote*; *Ocote*; *Sachaj* (Alta Verapaz). Figure 9.

Abundant on hillsides and plains at low elevations, 600 meters or lower; eastern Petén; Alta Verapaz (Savanna Sachaj, between Sachaj

and Sacacae); Izabal (lowlands, and on the slopes of Sierra del Mico, at about 600 meters or lower). Southern Quintana Roo; British Honduras; Atlantic lowlands of Honduras and Nicaragua south to the region of Bluefields; West Indies.

A rather slender tree, commonly 15-30 meters high with a trunk sometimes almost a meter in diameter, the bark gray, brownish-gray, or reddish-brown, broken into shallow longitudinal plates; buds pale chestnut or reddish-brown; branches horizontally spreading, the youngest ones 6-10 mm. thick, rather rough, dark or brownish-gray; leaves usually 3 in a fascicle, sometimes 4-5, rarely 2, grass-green on all sides, 5-25 cm. long, 1-1.5 mm. thick, rather stiff, serrulate, with stomata on all sides; resin ducts internal, mostly 3-4, the fibro-vascular bundles of the leaf 2, the sheaths persistent; cones oval or oblong-ovoid, reflexed and dehiscent at maturity, 4-12 cm. long, 3.5-6 cm. thick, dark or rufous brown, lustrous, on stalks 1-1.5 cm. long; cone scales thickened at the ends, the umbo prominent and somewhat mucronate; seed usually 4-5 mm. long, the wing of the seed usually remaining attached, its base thin or slightly thickened, 1.8-2 cm. long and 6 mm. wide.

This is one of the easily recognized pines of Guatemala because of its limited range, which is widely separated from those of all other local pines. It has the distinction of extending farther southward than any other American pine, although *Pinus oocarpa* reaches almost as far south, but in the interior of Nicaragua. The Caribbean pine is naturally one of the conspicuous trees of northeastern Guatemala, and it is abundant in many places, forming extensive areas of pine savanna, similar to those of southern Florida (which are formed by a related species), and also extending well up on the slopes of Sierra del Mico in Izabal, where it forms open and rather sparse stands, sometimes in association with the cohune palm, and with an abundant undergrowth of small shrubs, many grasses and sedges, and a variety of small herbs, most of them of the same genera as those in the pine forests of the Florida Everglades. Riding on the train from Puerto Barrios toward Guatemala, one sees good examples of pine forest on the mountains of the Gualán region, and even better ones toward the coast, where in some places the train passes through pine savannas, in the region between Cristina and Virginia. In Guatemala pines do not reach the coast, as they do at some places in Nicaragua. In British Honduras the Caribbean pine is even more abundant. It ascends to about 900 meters in the mountains and is said to occupy about one-third the area of the colony. The wood is of great importance locally for construction purposes. Some of the British Honduras trees are reported to attain a height of 30 meters.

The Maya name of this pine, in Quintana Roo and British Honduras, is "huhub."



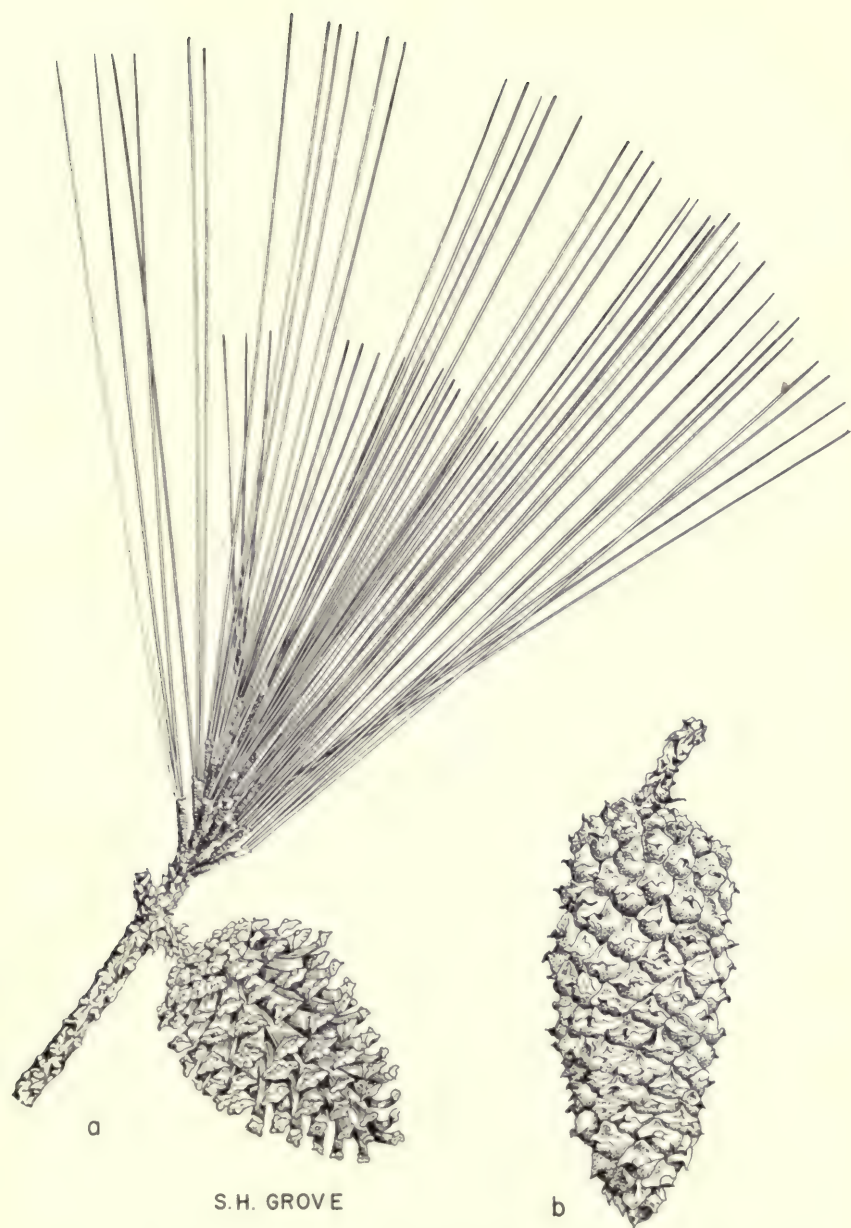


FIG. 9. *Pinus caribaea*. a, Leafy branch with attached cone ( $\times \frac{1}{2}$ ). b, Cone, unopened ( $\times 1$ ).



This pine has been confused with the slash pine of the southeastern United States, *P. Elliottii* Engelm., which does not occur in Central America. From this species it may be distinguished by the shorter weaker prickles of the cone scales, the smaller seeds with wings usually remaining attached, and the grouping of leaves predominantly in fascicles of 3's. In Journ. For. 50: 918-923. 1952, Drs. Little and Dorman discuss the taxonomy and nomenclature of the slash pine (*P. Elliottii*) and the Caribbean pine (*P. caribaea*).

**Pinus Montezumae** Lambert, Descr. Pinus ed. 3. 1: 39. 1832. *P. filifolia* Lindl. Bot. Reg. 26, Misc. 61. 1839. *P. Montezumae* var. *Lindleyi* Loudon, Encycl. Trees 1004. f. 1882. 1883. *Pino*; *Pino colorado*; *Pino de ocote*. Figure 10.

Mountain slopes or plains, often forming extensive stands, at about 1050-3000 meters; Baja Verapaz; Chimaltenango; Quiché; Huehuetenango; Totonicapán; Quezaltenango; San Marcos. Widely distributed in Mexico.

A medium-sized or large tree, sometimes 30 meters high with a trunk 75 cm. or even more in diameter; bark dark gray, very rough, broken into conspicuous plates separated by deep furrows and ridges; youngest branches stout, 8-12 mm. thick, very rough, the decurrent bases of the sheaths of the leaf fascicles close together and conspicuous; leaves usually in fascicles of 5, occasionally in 4's or 6's, thickly set on young branches, dark grass-green, the youngest leaves somewhat lighter and brighter green, 15-45 cm. long, 1-1.5 mm. thick, stout and usually rather stiff, erect, abundantly serrulate, with stomata on all sides, the resin ducts medial, 3 to 6, the leaf with 2 fibro-vascular bundles; leaf sheaths persistent and conspicuous; cones opening at maturity, deciduous or nearly deciduous, variable in size, ovoid-conic to long-conic, spreading or drooping, 18-30 cm. long or often shorter, 4.5-8 cm. thick, dull to rich brown; cone scales thickened at the tip; umbo dorsal, the prickle inconspicuous, mostly deciduous; wing of the seed thin, 2-2.5 cm. long, its base thin or slightly thickened.

This is one of the common pines of western Guatemala, often growing in association with *P. oocarpa* and perhaps *P. pseudostrobus*. All these species are much alike in the field.

**Pinus Montezumae** var. **rudis** (Endl.) Shaw, Pines Mex. 22. 1909. *P. rudis* Endl. Syn. Conif. 151. 1847. *P. Hartwegii* Lindl. Bot. Reg. 25, Misc. 62. 1839. *P. Montezumae* var. *Hartwegii* Engelm. Trans. St. Louis Acad. Sci. 4: 177. 1880, according to many authors, but the combination not legitimately made. *P. Donnell-Smithii* Masters in Donn. Smith, Bot. Gaz. 16: 199. pl. 2. 1891 (type collected near the summit of Volcán de Agua, Sacatepéquez, J. D. Smith 2182). *Teccamanil* (San Marcos); *Pino*; *Pino colorado*; *Pino de ocote*.



FIG. 10. *Pinus Montezumae*. a, Leafy branch with attached cone ( $\times \frac{1}{8}$ ).  
b, Fascicle of needles ( $\times \frac{3}{8}$ ).

Occurring at high elevations, chiefly on the upper slopes of the volcanoes and on the high mountains of Huehuetenango, in a belt of about 3000–3500 meters elevation; Sacatepéquez (Volcán de Agua); Chimaltenango (volcanoes of Fuego and Acatenango, Cerro Tecpán); Totonicapán; Huehuetenango (Sierra de los Cuchumatanes); Quezaltenango (Volcán de Santa María); San Marcos (volcanoes of Tajumulco and Tacaná). Widely distributed in Mexico.

Usually a large tree, sometimes 30 meters high but usually lower, at the highest elevations often a shrub of 2 meters, the trunk usually tall and slender, the crown often dense and compact; leaves shorter than in the typical variety, mostly 7–15 cm. long; cones generally shorter and darker, often dark purple or almost black, mostly 7–13 cm. long and 5–8 cm. thick.

This is one of the most easily recognized of the pitch pines of Guatemala, because of its short leaves and the limited areas in which it grows. Although treated as a distinct species by some authors, such as Martínez and Loock, the differences by which it is supposed to be separated do not hold true in Guatemalan material. The leaves are nearly always erect in the Guatemalan trees of *P. Montezumae*. On some of the volcanoes it can be noted that trees of this species gradually become smaller and more dwarfed as the summit is approached. With dwarfing of the trees, the leaves also become shorter. Thus, at the higher elevations, *P. Montezumae* var. *rudis* appears very distinct, but at lower elevations it is not easily distinguishable from typical *P. Montezumae*. The differences used by Loock (loc. cit. p. 94) to separate *P. Hartwegii* from *P. rudis*, based upon color of cone, type of apophyses, thickness of cone scale, and constant numbers of leaves in a fascicle, certainly do not hold true in Guatemalan material examined. Both of these entities are therefore considered to be the same and are treated as *P. Montezumae* var. *rudis*.

On the volcanoes as well as in the Cuchumatanes (where it grows on limestone), it forms forests of distinctive aspect, the trees of rather pale appearance as to foliage, and usually standing well apart in areas covered with dense stands of bunch-grasses. On the central and western volcanoes the variety marks a very distinct zone of vegetation, beginning at the upper limit of the moist or wet, very dense, broad-leaved forest, where no pines occur, and extending to the summits of the volcanoes. At highest elevations the plants often grow in the most exposed places, subjected to the strongest gales. The trees are progressively smaller as the elevation increases. Vast numbers of dead trees occur on the upper slopes of the central volcanoes. The Indians insist they have been killed by gases from the craters, but it is probable that all of them are victims of insect attack.



***Pinus oocarpa*** Schiede, *Linnaea* 12: 491. 1838. *P. oocarpoides* Lindl. ex Loudon, *Encycl. Trees* 1118. 1883. *P. tecumumani* Schwertfeger, *Inf. Gob. Guat. sobre Entom. For.* 1: 39. *figs. 112-122, 139.* 1953 (without Latin diagnosis, type from Guatemala, *Schwertfeger* 52). *Pino; Pino de ocote; Chaj* (Cobán, Quecchí). Figure 11.

The most abundant pine of Guatemala, widely distributed on mountain slopes and plains, sometimes forming almost pure stands but often associated with oaks and sometimes with other pines, occurring at 1000-2700 meters; Alta Verapaz; Baja Verapaz; El Progreso; Zacapa; Chiquimula; Jalapa; Jutiapa; Guatemala; Sacatepéquez; Chimaltenango; Sololá; Quiché; Totonicapán; Huehuetenango; doubtless also in other departments. Widely distributed in Mexico; Honduras; El Salvador; Nicaragua.

A large or medium-sized tree, 15-25 meters high or often taller, often with a thick trunk; bark grayish- or reddish-brown, rough, deeply fissured into broad plates; young shoots uninodal, pruinose; youngest branchlets 6-10 mm. thick, moderately or conspicuously rough, light or reddish-brown; leaves mostly in fascicles of 5, sometimes in 4's, rich olive-green or grass-green on all sides, 12-30 cm. long, 1-1.2 mm. thick, flexible and rather slender, subcoriaceous, ascending to erect, abundantly serrulate; stomata on all sides of the leaf, the resin ducts mostly septal, sometimes internal, the leaf with 2 fibro-vascular bundles; leaf sheaths persistent and conspicuous; cones broadly ovoid to ovoid-conic, persistent, opening late in maturity, the lower scales usually remaining closed for a long period, the cones pendulous, on a peduncle as much as 3.5 cm. long, light yellow-brown or reddish-brown; cone scales thickened at the tip, the umbo dorsal, often with a spine-like point; wing of the seed often thickened at the base.

This is probably the most abundant of all the Guatemalan pines, being the commonest species of the central and northwestern mountains, where it forms very extensive stands in some regions. It is an important source of lumber. The species extends southward far into the interior of Nicaragua, which is the southern limit for the distribution of mountain pines in Central America. It is the common pine of the Cobán region of Alta Verapaz, where the rainfall is much greater than in most parts of its range and the pine forests are exceptionally thrifty and handsome. These forests, however, have been much depleted by lumbering operations. Here the pines usually grow in association with *Liquidambar* rather than oaks. The young plants about Cobán often make an extraordinary growth, attaining a height of 2 meters before branching. The handsome, very pale, yellowish wood is much used about Cobán for all kinds of construction, and also for furniture. It supplies most of the lumber used in the region.

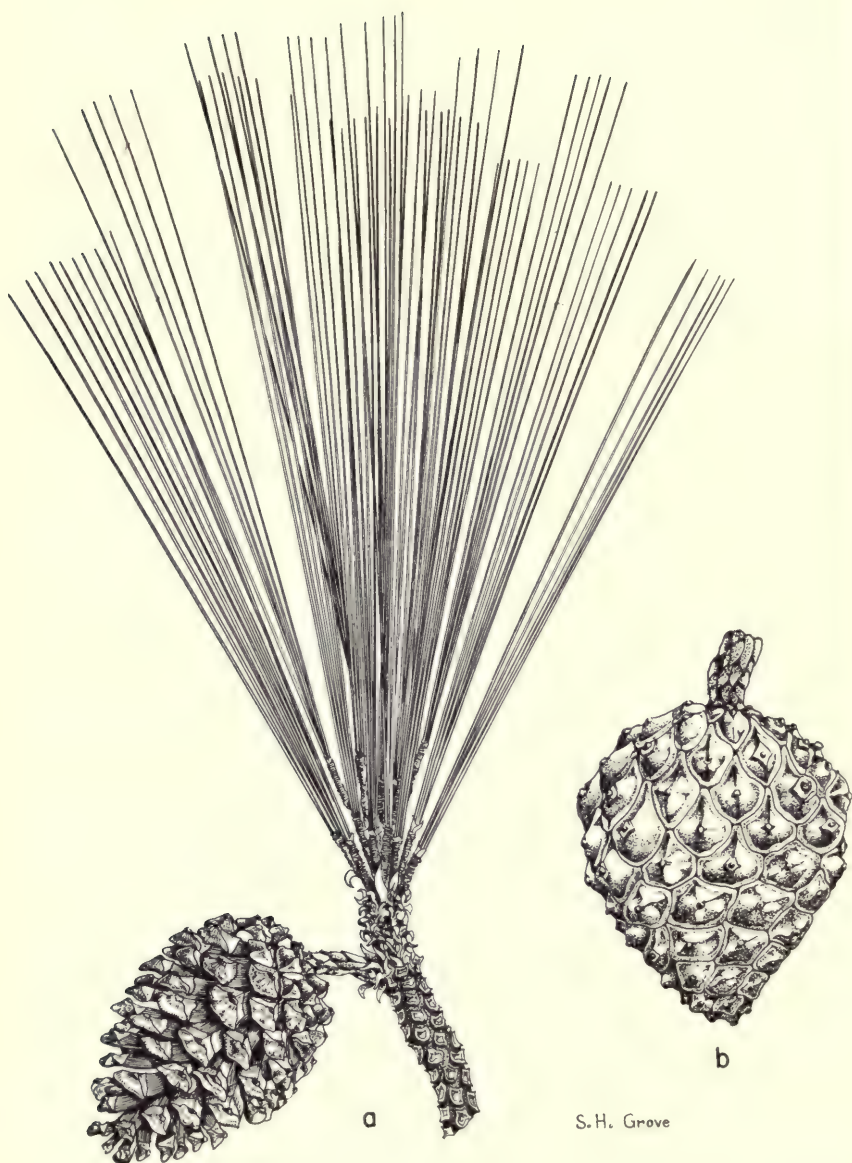


FIG. 11. *Pinus oocarpa*. *a*, Portion of leafy branch with attached cone ( $\times \frac{1}{2}$ ).  
*b*, Cone, unopened ( $\times 1$ ).

About 40 or 45 years ago Gustav Helmrich planted a large area on the hillsides of Finca Samac near Cobán with the native pine. The trees now are medium-sized or large and ready to cut. From a distance they have every appearance of being a native forest. Oak trees planted at the same time are about half as large.

The complexities of the taxonomy and nomenclature of *Pinus* species have been recently augmented by the publication of another species, *Pinus tecumumani*, proposed, without Latin diagnosis, by Dr. Fritz Schwertfeger (ibid. 1953). One of the specimens (*Schwertfeger* 52), upon which the type collection is based, was identified by the junior author as *P. oocarpa* Schiede. Despite Dr. Schwertfeger's insistence on the recognition of this and other collections which he made (nos. 38, 69, 70, 71, and 72) as constituting an undescribed species, a re-examination of his material does not support his claim. He himself admits (loc. cit., p. 39) that, from a botanical standpoint, *P. tecumumani* may be considered as a variety or form of *P. oocarpa*, and that the two resemble one another in many respects.

Both *P. oocarpa* and *P. pseudostrobus* appear to be variable, and the type material of *P. tecumumani* seems best interpreted as representing a somewhat variant form of *P. oocarpa*, although it is also possible that it may be considered as of hybrid ancestry between *P. oocarpa* and *P. pseudostrobus*. The shape, size, and short stipe of the cone would ally *P. tecumumani* to *P. oocarpa*, whereas the lesser thickness of the needles and their sometimes pendent position would ally *P. tecumumani* to *P. pseudostrobus*.

***Pinus pseudostrobus*** Lindl. Bot. Reg. 25, Misc. 63. 1839. *P. tenuifolia* Benth. Pl. Hartweg. 92. 1842. *P. pseudostrobus* var. *tenuifolia* (Benth.) Shaw, Pines of Mexico 20. pl. 13. 1909. *Pino*; *Pino de ocote*; *pino blanco* and *pinabete* (Honduras.) Figure 12.

Usually in rather moist forest, at 1000–3000 meters; descending on the Pacific slope to 850 meters, but in most parts of the country found at 1500 meters or higher; Alta Verapaz(?); Baja Verapaz; El Progreso; Jalapa; Guatemala; Sacatepéquez; Chimaltenango; Sololá; Suchitepéquez; Quezaltenango; Totonicapán; Huehuetenango; perhaps in some other departments. Widely distributed in Mexico; British Honduras (Baker's Pine Ridge); Honduras; Nicaragua.

A medium-sized or large tree, 10–30 meters high, the trunk sometimes almost a meter in diameter, the bark smooth and gray at first, becoming brownish-gray or blackish in age, the upper part of the trunk and the branches sometimes reddish-brown; youngest branches 4–8 mm. thick, almost smooth or slightly roughened, light to dark brown or reddish-brown, conspicuously pruinose, the internodes long;





FIG. 12. *Pinus pseudostrobus*. Branch, showing pendent leaves and cone attached ( $\times \frac{1}{3}$ ).

leaves usually 5 in a cluster, sometimes 6, gray-green or grass-green on all sides, flexible, soft, slender, drooping or laxly spreading or arching, 12–35 cm. long, 0.6–1 mm. thick, moderately and minutely serrulate; stomata present on all sides of the leaf, the resin ducts medial, the leaf with 2 fibro-vascular bundles; leaf sheaths persistent; cones dehiscent and deciduous at maturity, ovoid to ovoid-conic or oblong-conic, 5.5–14 cm. long, 2.5–10 cm. thick, chestnut to dark brown; cone scales thickened at the tip, sometimes more or less prolonged, the umbo dorsal, sometimes with a salient tip; wing of the seed articulate, its base thin or slightly thickened.

This species is easily confused with *P. oocarpa*, from which it may be distinguished by the usually drooping, less rigid leaves, usually

sessile cones which open at maturity, generally more slender, less roughened branches, and medial rather than septal resin ducts. It is a common pine of the central regions, forming sometimes pure stands but often mixed with other pines or with oaks.

Although Martínez (loc. cit., p. 68) recognizes *P. tenuifolia* Benth. as a distinct species, we are unable to separate it from *P. pseudostrobus*, either specifically or varietally, as it was treated by Shaw. Martínez uses the character of the association of the cone with an oblique peduncle as the principal means of separating *P. tenuifolia* from *P. pseudostrobus*. We have not found this or other characters stressed by Martínez to hold true for use in distinguishing *P. tenuifolia* from *P. pseudostrobus*.

***Pinus Strobilus* L., var. *chiapensis* Martínez**, Anal. Inst. Biol. Mexico 11: 81. 1940. *Pinabete* (Chiapas).

Mountain slopes, in stands of pine and hardwood forests, generally at elevations between 800–2000 meters; Quiché (Río Suchún below Nebáj); Huehuetenango (Sierra de los Cuchumatanes). Southern Mexico (Vera Cruz, Oaxaca, and Chiapas). Figure 13.

A large tree, sometimes 30 meters high with a trunk up to 1 meter or more in diameter; bark rough, light gray to brownish, broken into shallow furrows and ridges; younger branches smooth, grayish to greenish-gray; leaves 5 in a fascicle, light green or yellowish-green, silvery or whitish beneath, 5.5–12.5 cm. long, 0.6–1 mm. thick, slender, flexible, serrulate, the teeth small and remote, the stomata ventral only, the resin ducts external, the fibro-vascular bundle only 1; leaf sheaths soon deciduous; cones broadly cylindrical, slightly tapering towards the apex, 10–13 cm. long, 4.5–6 cm. thick, yellowish to reddish-brown, rather dull; cone scales flattened, the apophysis yellowish-brown, rounded and not prolonged at apex, the body reddish-brown, the umbo terminal; seeds dark brown, with a brown wing 2.5 cm. long and 8–9 mm. wide.

Like *Pinus caribaea*, this species is of very limited distribution in Guatemala, being confined to mountain forests in the departments of Quiché and Huehuetenango. It resembles *P. Ayacahuite*, but occurs at lower elevations, generally between 1400 and 1800 meters, but sometimes at elevations as low as 800 meters, on the lower slopes of the Sierra de los Cuchumatanes. On Cerro Victoria, near Barillas, in the department of Huehuetenango, it is associated with forests of *Liquidambar*, while in the department of Quiché its forest associates are *Liquidambar*, *Acer Skutchii*, *Platanus*, *Quercus*, *Fraxinus*, and others whose relationships are with the flora of the temperate zone of the southeastern United States.



FIG. 13. *Pinus Strobus* var. *chiapensis*. a, Leafy branch ( $\times \frac{1}{2}$ ). b, Cone ( $\times \frac{1}{2}$ ).

### TAXODIACEAE. Bald Cypress Family

*Reference:* R. Pilger, *Taxodiaceae*, *Pflanzenfamilien* ed. 2. 13: 342-360. 1926.

Large trees; leaves scale-like or needle-like, sometimes falcate, persistent or deciduous; staminate flowers solitary, terminal or axillary, capitately clustered or in long pendent panicles; filaments short, the anther scale broad, with 2-9 free sporangia pendulous from its lower edge; pistillate inflorescence solitary, terminal, with numerous spirally arranged bracts, each bearing 2-9 ovules; scales of the cone ligneous or thick-coriaceous, rounded, opening at maturity; seeds with a narrowly winged margin.

Nine genera, seven of them Asiatic. The only other American one is *Sequoia*, confined to the Pacific coast of the United States, whose species include the most massive trees known.



Leaves deciduous; staminate flowers in terminal, much elongate, drooping panicles.

*Taxodium*

Leaves persistent; staminate flowers in short stiff spikes at the ends of the branches.

Leaves subulate, 6–8 mm. long.....*Cryptomeria*

Leaves linear-lanceolate, mostly 25–40 mm. long.....*Cunninghamia*

## CRYPTOMERIA D. Don

Evergreen trees with reddish-brown bark peeling off in long shreds, the crown pyramidal, with spreading branches; leaves spirally arranged, in 5 vertical ranks, decurrent at the base, directed forward and curved inward, awl-shaped, laterally compressed; flowers monoecious; staminate flowers oblong, composed of numerous imbricate stamens, sessile, axillary, forming short spikes at the ends of the branchlets; pistillate flowers globose, solitary at the ends of the short branchlets; cones brown, subglobose, maturing the first year but persistent after shedding their seeds; cone scales 20–30, woody, cuneate, enlarged above into a disk, this bearing a recurved mucro at its middle and with 3–5 pointed processes on the upper margin; seeds 2–5 in each scale, triangular-oblong, slightly compressed, narrowly winged; cotyledons 2–3.

The genus consists of a single species.

*Cryptomeria japonica* (L. f.) D. Don, Trans. Linn. Soc. 18: 167. 1841. *Cupressus japonica* L. f. Suppl. Pl. 421. 1781.

Native of China and Japan, occasionally planted for ornament about Guatemala City and probably elsewhere.

A large tree, sometimes becoming 50 meters high, with a very thick trunk; leaves linear-subulate, rigid, subulate, 6–8 mm. long, laterally compressed, carinate above and beneath, with stomata on both sides, bright green; staminate flowers about 6 mm. long; cones globose, 1.5–2.5 cm. in diameter; seeds dark brown, 5–6 mm. long.

The tree is uncommon in Guatemala, but there are many fine large individuals in Costa Rica. It seems to thrive in mountain regions of the tropics, especially where there is abundant moisture.

## CUNNINGHAMIA R. Brown

Evergreen trees, the branches spreading, pendulous at the ends; leaves spirally arranged, decurrent at the base, linear-lanceolate, 2-ranked, spreading; flowers monoecious, the staminate flowers cylindric-oblong, in terminal clusters; pistillate flowers globose, 1–3 at the end of a branchlet; cones subglobose, the scales thick-coriaceous, broadly ovate, pointed, irregularly serrate, each scale bearing 3 narrowly winged seeds; cotyledons 2.

The genus consists of two species, both Asiatic.

**Cunninghamia lanceolata** Hook. Bot. Mag. *pl.* 2743. 1827.

Native of southern, central, and western China; planted for ornament and shade in Guatemala City and probably elsewhere in the country.

A large tree, attaining a height of 25 meters, the bark brownish, separating in irregular plates and exposing the reddish inner bark; leaves crowded, linear-lanceolate, spine-tipped, mostly 3–6 cm. long, lustrous above, with 2 white longitudinal bands beneath; cones globose-ovoid, 2.5–5 cm. long, brown.

**TAXODIUM** L. Richard. Bald Cypress

Resinous trees, usually deciduous, the bark light brown, shallowly furrowed and scaly, the branches suberect or spreading; branchlets of 2 kinds, those near the tips of the branches persistent and with axillary buds, those on the lower part of the branch deciduous and without axillary buds; winter buds globose, scaly; leaves alternate, subulate or flat and linear, with 2 bands of stomata on the lower surface, the leaves of the persistent branchlets spreading, deciduous; flowers small, monoecious; staminate flowers in slender drooping panicles, the flowers consisting of 6–8 spirally arranged stamens; pistillate flowers solitary or geminate near the ends of the branches of the preceding year, subglobose, consisting of imbricate scales, each scale bearing 2 ovules within near the base; fruit a short-stalked, globose or ovoid, small cone, ripening the first year, consisting of many thick, spirally arranged, peltate scales, these dilated from a slender stipe into an irregularly 4-sided, often mucronate disk, the fertile scales each with usually 2 seeds; seeds unequally trigonous, with 3 thick wings; cotyledons 4–9.

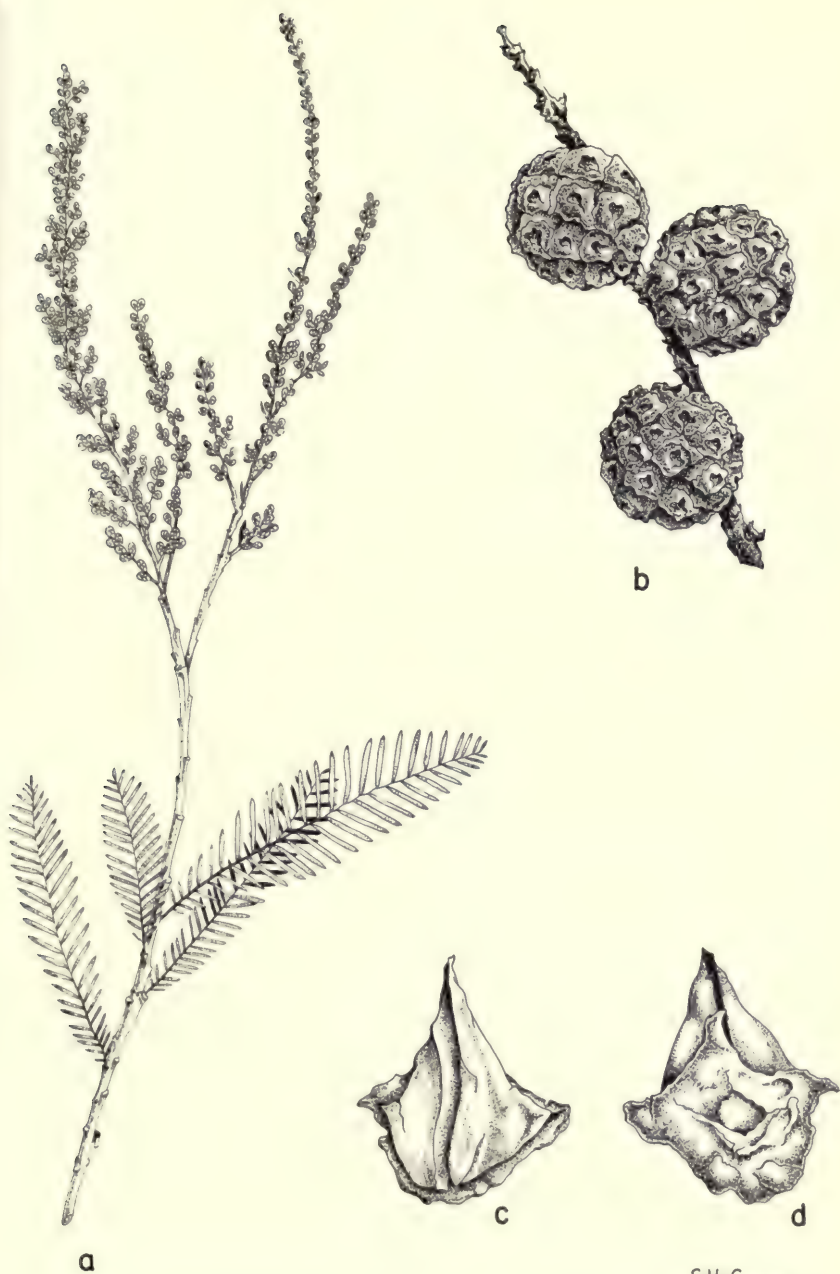
One and perhaps two other species are known, in the southern and southeastern United States.

**Taxodium mucronatum** Tenore, Ann. Sci. Nat. III. 19: 355. 1853. *T. mexicanum* Carrière, Trait. Conif. 147. 1855. *Sabino*; *Camphoreta* (Suchitepéquez, where cultivated).

Along the borders of streams, often growing in shallow water, 800–2000 meters; Huehuetenango (extending eastward to Los Pinitos, just southeast of Huehuetenango; collected also near Democracia, near Santa Ana Huista, near Cuilco, and San Sebastián). Widely distributed in Mexico. Figure 14.

A large tree, sometimes 30 meters high, the trunk tall, straight, enlarged near the base, the bark brownish-red or often very pale; leaves, and many of the branchlets, deciduous, linear, 6–12 mm. long, thin and soft; cones subglobose, brown, 1.5–2.5 cm. in diameter.

In Mexico usually called “ciprés.” This is a common tree in parts of Mexico and there are some giant historic trees there, the most famous being that at Santa María del Tule, Oaxaca, which has a height of 38 meters and a trunk circumference of 51 meters, with a



S.H. Grove

FIG. 14. *Tazodium mucronatum*. a, Flowering branch with leaves ( $\times \frac{1}{2}$ ). b, Fruiting branch ( $\times 1$ ). c, Seed, dorsal view ( $\times 3$ ). d, Seed, ventral view ( $\times 3$ ).



maximum diameter of 12 meters. The Ciprés de Montezuma at Chapultepec has a height of 51 meters and a trunk circumference of 15 meters. At the time of the Conquest it was a noted tree, and its age has been estimated at 700 years. No other trees of comparable size are found in Guatemala. At the southeastern limit of their range, near Huehuetenango, the trees are few and small, although it is probable that formerly they were more numerous and with larger individuals among them. Some trees grow along the stream at the base of the hill on which lie the ruins of Zaculeu, the site of the large Indian city that preceded the present city of Huehuetenango. It is probable that the name of this settlement is derived from the Nahuatl name for *Taxodium*, *ahuehuatl*, and at first probably was Ahuehuetenango. A different origin of the name is given by Guatemalan writers, but the one here suggested seems fairly obvious. All the Indian cities had perfectly good names in the Indian tongues, but when the Spanish Conquistadores arrived, accompanied by their Mexican mercenaries, the latter renamed all the cities in their own language, and all or most of these names persist to the present time, in regions where Nahuatl dialects never were spoken by the original inhabitants.

The wood of this bald cypress is light or dark brown or yellowish and susceptible of a good polish. It is soft and rather weak, but in Mexico it is esteemed for construction purposes, especially because it is resistant to decay and insect attacks. In Guatemala it is too rare to be of economic importance.

The leaves of the bald cypress in Guatemala turn yellow and red about the first of January, or perhaps even earlier, and are then very conspicuous. The few scattered trees along the Río Naranjo below Huehuetenango are poorly developed, but they were found fruiting abundantly, and there were many seedlings about them. Some of the trees grow in running water, which must be much deeper during the height of the rainy season. Scattered *Taxodium* trees are in cultivation in various parts of the country, as about the capital and Cobán and even in the *fincas* between Colomba and Coatepeque.

### TAXACEAE. Yew Family

Trees or shrubs with evergreen foliage, resinous in almost all parts; leaves alternate and usually 2-ranked or spirally arranged, linear, entire; flowers dioecious, the staminate flowers solitary or in small cones, axillary; stamens with 2-8 sporangia; pistillate flowers borne on small axillary twigs, the ovary terminal, surrounded at the base by pairs of scales; seeds partially enclosed in a fleshy colored aril; cotyledons 2.

Four genera are known, *Taxus*, *Torreya*, with 5 species in Japan and China, California, and Florida, *Austrotaxus*, with one species in New Caledonia, and *Amentotaxus*, with one species in China.

### TAXUS L. Yew

Trees or shrubs, the bark reddish or reddish-brown, scaly, the branches usually spreading; branchlets irregularly alternate, the winter buds with imbricate scales; leaves spirally arranged, spreading in 2 ranks, linear, often falcate, with 2 broad, yellowish or grayish-green bands beneath, without resin ducts; flowers dioecious or rarely monoecious, the staminate in stipitate heads of 6–14 stamens, each stamen with 5–8 sporangia; pistillate flowers consisting of several imbricate scales, the terminal one bearing an ovule with a disk at its base; seeds ovoid, subangulate, surrounded by a red fleshy cup open at its apex; endosperm uniform.

Seven or eight species are known, widely distributed in the northern hemisphere. They are all closely related, differing principally in range, and have been treated by some authors as forms of a single species, the European *T. baccata* L. Four species are known from North America, none in South America. The heartwood is bright orange to brown, the sapwood thin and white; of rather high luster, odorless and tasteless; hard, moderately heavy, stiff, and elastic, with a specific gravity of about 0.70; of very fine and uniform texture and straight or variable grain. The wood has long been used in Europe for bows, and at the present time its principal use is for the same purpose.

***Taxus globosa*** Schlecht. Linnaea 12: 496. 1838. *Ciprés*; *Pinabete*.

In cloud forest in the mountains at rather high elevations, 2200–3000 meters; Baja Verapaz; El Progreso (Sierra de las Minas; Volcán de Santa Luisa); Zacapa (Sierra de las Minas, Volcán Gemelos; Monte Virgen); Huehuetenango (Sierra de los Cuchumatanes, Cerro Cananán). Southern Mexico (San Luis Potosí; Hidalgo; Veracruz; Oaxaca). Figure 15.

A large shrub or a small or medium-sized tree, sometimes 15 meters high; leaves linear, somewhat falcate outwardly, 2–3.5 cm. long, 2–3 mm. wide, cuspidate, slightly narrowed at the sessile base, olive-green above and lustrous, somewhat silvery and pale beneath, the margins revolute in drying, the costa prominent beneath and also on the upper surface; mature branchlets reddish-brown, somewhat angulate; pistillate branchlets rather stout; cup subtending the seed about 4 mm. broad (when dry); seed ovoid or oval-ovoid, about 5 mm. long, apiculate at the apex.

This tree seems to be local in the Guatemalan mountains, although it is plentiful in the localities where it has been found. These



S.H. Gro

FIG. 15. *Taxus globosa*. a, Leafy branch ( $\times \frac{1}{2}$ ). b, Fruit ( $\times 4$ ).



are separated by a long distance from the nearest Mexican localities from which the tree has been reported. The seeds of the various yews are reported to contain a poisonous alkaloid (taxine) and eating them has sometimes caused the death of human beings. The bark is said to be rich in tannin.

A species of *Ephedra*, of the family Ephedraceae, is in cultivation in the Jardín Botánico in Guatemala. It is a low shrub with naked, jointed branches, the leaves represented by small scales, the fruit small and cone-like. The determination of the plant is uncertain, but it may be the European *E. distachya* L.

### TYPHACEAE. Cat-tail Family

*References:* P. Graebner, Typhaceae, Pflanzenreich IV. 8. 1900.  
Percy Wilson, Typhaceae, N. Amer. Fl. 17: 3-4. 1909.

The family consists of a single genus.

### TYPHA. Cat-tail

Glabrous herbs, growing in water or wet soil, with creeping rootstocks and simple erect stems; leaves linear or strap-shaped, sheathing at the base, flat, more or less convex on the back, entire, parallel-veined; flowers unisexual, densely crowded in compact cylindric spikes, the upper portion of the spike staminate, the lower pistillate; staminate inflorescence terminal, separated or contiguous to the pistillate inflorescence; each spike usually subtended by a spathaceous fugacious bract in early anthesis, the flowers irregularly intermingled with variously shaped hairs; stamens 1-7; filaments short or long, free or connate; anthers linear or oblong, basifixed, 2-celled, longitudinally dehiscent, the connective produced beyond the cells in a conic fleshy acumen; pollen grains simple or compound; pistillate flowers ebracteolate or mingled with slender, clavate or spatulate bractlets, and often with abortive pistillate flowers mixed with them; gynophore slender, the perianth composed of several delicate, silky, simple or clavate hairs; ovary superior, usually 1-celled, more or less stalked, fusiform, with a solitary pendulous anatropous ovule; style elongate, slender, erect; stigma linear, spatulate, or rhombic-fusiform, unilateral; fruit minute, subsessile or long-stipitate, fusiform or ellipsoid, with a membranous or coriaceous pericarp, longitudinally splitting; seed subcylindric or narrowly ellipsoid, the testa thin, membranaceous; endosperm carnose or farinaceous; embryo cylindric, straight.

About nine species, of wide distribution. Only the following are known from Central America.

Staminate and pistillate portions of the spike contiguous; pistillate spike dark chocolate-brown; pistillate flowers ebracteolate; stigma flattened, obliquely rhombic-lanceolate; aborted pistil clavate; pollen grains in 4's, 4-celled.

*T. latifolia*

Staminate and pistillate portions of the spike separated; pistillate spikes light or reddish brown; pistillate flowers bracteolate; stigma linear or narrowly lanceolate; pollen grains single, one-celled. . . . . *T. domingensis*

***Typha latifolia* L. Sp. Pl. 971. 1753. Tul.**

In shallow water, especially at the edges of lakes, 1000–1900 meters; Alta Verapaz; Baja Verapaz; Sacatepéquez (near Antigua); Sololá (Finca Mocá); Huehuetenango. Widely distributed in North America and in the Old World.

Plants robust, 1–2.5 meters tall; leaves broadly linear and surpassing the inflorescence, flat, 6–25 mm. wide; staminate and pistillate spikes about equal in length; staminate inflorescence mustard or brownish-yellow, 7–13 cm. long, deciduous after flowering, the hairs sordid white, linear, acute at the apex; pistillate inflorescence 0.5–3.5 cm. thick, 7–30 cm. long, at least 6–8 (up to 20) times longer than broad; stigma dark brown or blackish, surpassing the hairs of the gynophore; denuded rachis of the mature pistillate spike stout, 8–11 mm. thick, conspicuous by the long bristle-like persistent pedicels.

Recent studies reveal that the fiber of the cat-tails may be used as a substitute for cotton and linen in making articles of clothing, rugs, and many other products. The mature fruiting spikes are often used in the United States for their ornamental value, and the solid and young spikes are pickled and served in the form of a relish or in salads.

***Typha domingensis* Pers. Syn. Pl. 2: 532. 1807. *T. truxillensis* HBK. Nov. Gen. & Sp. 1: 82. 1815. *T. angustifolia* of many authors, not L. Tul; Tule; Espadaña; Enea. Figure 16.**

In wet soil or often in shallow water, in ditches or along the borders of lakes, ponds, and swamps, 1200 meters or lower; Izabal; Zacapa; Jutiapa; Guatemala; Quiché. Widely distributed in the western hemisphere.

Plants robust, 2–4 meters high; leaves flat, pale green, coriaceous, 5–20 cm. wide, usually not equaling the inflorescence; axis of the staminate inflorescence provided with reddish-brown hairs, these mostly branched, dilated at the apex, the branches curved; staminate inflorescence 0.7–2 dm. long; pistillate spikes pale brown, 10–40 cm. long, 5–22 mm. thick, increasing in thickness with approaching maturity; pedicels of the pistillate flowers up to 1 mm. long, the bractlets rhomboid-, obcordate-, obovate-, or elliptic-spatulate, about as long as the hairs; hairs simple, slightly enlarged or thickened, spatulate at the brownish apex, shorter than the stigmas; denuded rachis of the mature pistillate spike slender, 3–4.5 mm. thick, merely roughened by the short rigid pedicels.

The Maya name of Yucatan is “puh.” This species has usually been confused with *T. angustifolia*, which is not known to occur in

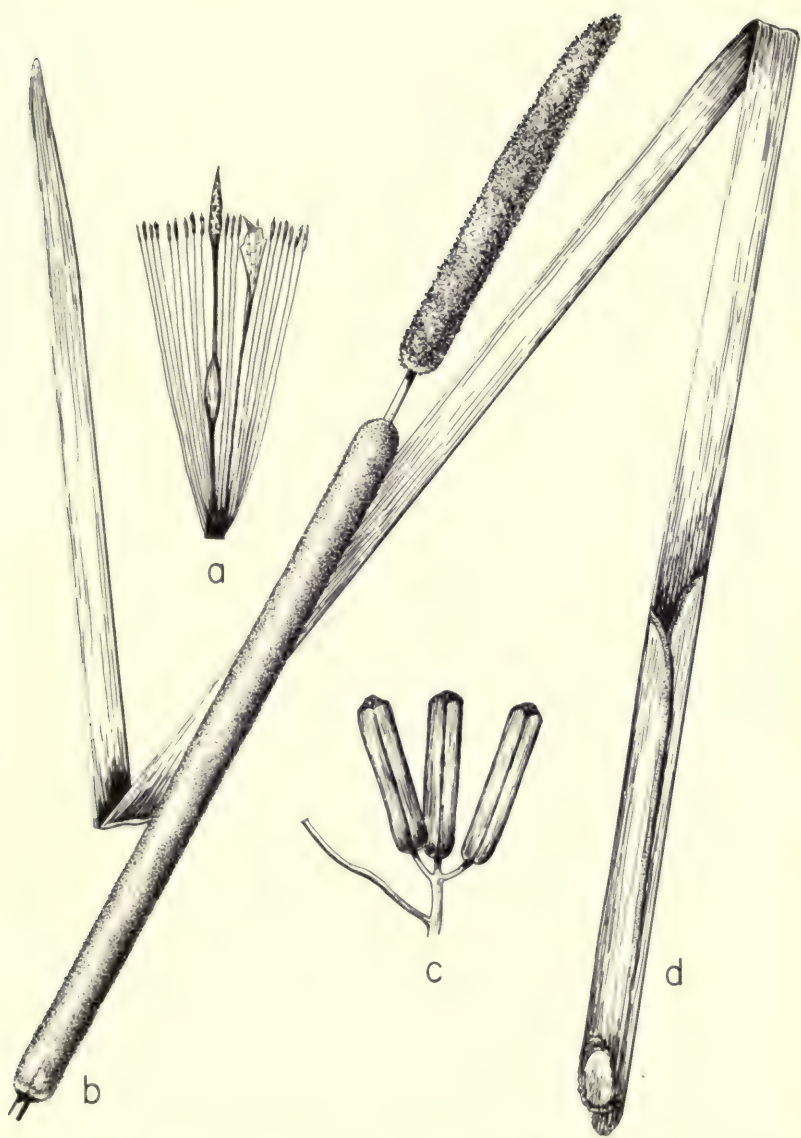


FIG. 16. *Typha domingensis*. a, Pistillate flower ( $\times 8$ ). b, Inflorescence ( $\times \frac{1}{2}$ ). c, Staminate flower ( $\times 10$ ). d, Leaf ( $\times \frac{1}{2}$ ).



Mexico or South or Central America. True *T. angustifolia* may be distinguished by the shorter staminate spikes, the much darker, castaneous or reddish brown, usually more slender pistillate spikes, which are overtopped by the fewer darker green, more membranaceous, plano-convex leaves, and the lack of conspicuous bractlets on the surface of the pistillate inflorescence; *T. domingensis* has lighter brown pistillate spikes becoming thicker in age and surpassing in height the more numerous, paler green, coriaceous, flattened leaves, and the surface of the pistillate spikes is covered by the ovate blades of the bractlets intermixed with the stigmas.

Some authors have interpreted Persoon's original publication of the name *T. domingensis* as intended by him to represent a category below that of species. Graebner, for example, in his treatment of the Typhaceae in *Das Pflanzenreich* (IV. 8. 14) interprets Persoon's name as a subspecies of *T. latifolia*, although Graebner uses the name *T. domingensis* in specific rank. Urban, however, in his *Symbolae Antillanae* (8: 5. 1920) ascribes the first specific combination of the name *T. domingensis* to Kunth (Enum. 3: 92. 1841), interpreting Persoon's name to be published as a subspecies. If Persoon had actually published *T. domingensis* as a variety or subspecies, as might at first glance be supposed, since the name and description were inserted between his species no. 1 (*T. latifolia*) and species no. 2 (*T. media*) and marked by an asterisk, then, under the present rules of nomenclature, the name would have to be rejected as a species in favor of the next specific name, i.e. *T. truxillensis* HBK., published in 1815. However, in the preface of volume 1, Persoon states that obscure or doubtful species are marked by a cross sign or asterisk ("Speciebus obscuris, aut quoad sedem dubiis, vel accuratiori indagatoni subjiendis, signa crucis seu asteriscum apposui"). Therefore, the name *T. domingensis*, marked by an asterisk and thought by Persoon to represent a doubtful entity, was published as a binomial in specific rank, and as the first published binomial in that rank must be accepted as a validly published specific name over the later published *T. truxillensis*.

In western North America the thick rootstocks were formerly used as food by some of the Indians. In Guatemala as well as in some other parts of Central America the fluffy "wool" from the flower spikes is used for stuffing pillows and cushions. It is not very satisfactory for the purpose, since it mats into hard lumps that are most uncomfortable in the case of pillows. The spongy leaves are much used for weaving the mats called *petates tules*, and for making *sopladores*, the fans used to fan charcoal fires. The plant is especially

abundant about Lago de Amatitlán, where there are wide and dense stands, of considerable economic importance locally. The cat-tail is plentiful also in the north coast. There, especially in thin forest, the plants are fully 2 meters high. In the Laguna de Ocubilá near Huehuetenango a curious phenomenon was observed. Most of the plants were about a meter high and all of approximately the same height. In the center of these large colonies were smaller ones of plants just twice as high and with slightly broader leaves. No intermediates were to be seen. It is possible that both *T. domingensis* and *T. latifolia* were represented, but it appeared that all the plants were of the same species.

*Typha glauca* Godr. (Fl. Lorre ed. 2: 20. 1843) has been reported from Guatemala. It is supposed to differ, like *T. angustifolia*, from *T. domingensis* in having fewer than 10 leaves, which are green and convex on the back and exceed the reddish-brown flowering spikes, in having shorter staminate inflorescences, and in the inconspicuous bractlets of the pistillate inflorescence. It is somewhat intermediate in characters between *T. domingensis* and *T. angustifolia* on the one hand, and between *T. latifolia* and *T. angustifolia* or *T. domingensis* on the other, and has been considered by many European workers to be of hybrid origin and was treated by Graebner in Das Pflanzenreich (IV. 8. 10: 16. 1900) as a hybrid between *T. angustifolia* and *T. latifolia*. Dr. Norman C. Fassett likewise is of the opinion that *T. glauca* can be considered only as of hybrid origin between *T. latifolia* and *T. domingensis*.

## PANDANACEAE. Screw-pine Family

*Reference:* O. Warburg, Pandanaceae, Pflanzenreich IV. 9: 1-97. 1900.

Trees or shrubs, often scandent, the main stem often branched, frequently emitting roots; leaves mostly lanceolate or linear, sessile and sheathing at the base, spirally arranged, longitudinally nerved and plicate, usually spiny-margined; flowers dioecious, the inflorescence simply spicate or subcapitate or compound, usually subtended by colored spathe-like bracts, the flowers sessile and commonly densely crowded, without a perianth; stamens few to many, spicately or umbellately disposed, the filaments usually filiform, short or elongate, the anthers 2-celled, ovate to linear, dehiscent by longitudinal slits, sometimes apiculate, rarely appendaged; ovary of 1-many carpels, 1-many-celled, the carpels irregularly disposed or annular or biseriate; ovules solitary and attached laterally, or numerous on lateral placentae, ascending, anatropous, borne on long or short funicles; styles usually none, sometimes spiniform, conic, furcate, or dentiform; stigmas appressed to the apex of the carpel or sometimes erect, usually reniform or hippocrepiform, rarely linear

or oblong; fruit drupaceous or baccate, 1-many-celled; seed with a thin or crustaceous testa, the endosperm copious, oily, the embryo minute, basal.

An Old World family of three genera.

### PANDANUS L. Screw-pine

Trees or shrubs, usually erect, the trunk often covered with the sheaths of old leaves, branched or rarely simple; leaves linear, usually spiny-margined and long-sheathing; staminate spadices spicate and compound, the pistillate terminal, spicate or racemose, the bracts usually whitish; stamens numerous, the filaments free, the anthers linear or oblong, basifixed, erect; carpels 1-many; stigmas usually reniform or hippocrepiform; ovules solitary; fruit a syncarp, globose, ovoid, or ellipsoid, rarely cylindric, the drupes densely crowded, the pericarp thin, the apical portion sometimes separating as a cap, the mesocarp fibrous or fibrous-fleshy; endocarp osseous, 1-many-celled; seed erect, commonly ovoid or fusiform.

About 150 species in the Old World tropics, some of them introduced into cultivation in the American tropics as ornamental plants.

**Pandanus tectorius** Soland. ex Parkinson, Journ. Voy. Endeavour. 1773. *P. odoratissimus* L. f. Suppl. Pl. 424. 1781. *P. odoratus* Salisb. Prodr. 3. 1796.

Planted abundantly in hedges and for ornament in the Pacific *boca costa*, and also for ornament generally in the lowlands, and even as high as Guatemala (1500 meters). Polynesia, southern Asia, and northern Australia.

Plants shrubby or tree-like, sometimes 6 meters tall but in cultivation usually lower, the trunk emitting aerial roots; leaves greatly elongate, long-attenuate at the apex, the margins densely armed with slender sharp spines; staminate inflorescence compound-spicate, very fragrant; stamens racemose-fasciculate; fruit as large as a human head, pendulous, the drupes 50–80 in the syncarp, red at maturity, 4–10 cm. long.

Occasional plants may be found in many of the lowland parks and fincas, but in some of the coffee regions, particularly in Suchitepéquez about Chicacao, and in Retalhuleu and Quezaltenango, along the road between Asintal and Colomba, there are long stretches of dense hedges of *Pandanus*. The form planted here has leaves with cream-colored margins. Perhaps also in cultivation is *P. dubius* Spreng., which has leaves 12–16 cm. wide (they are mostly 5–6 cm. in *P. tectorius*), abruptly contracted and cuspidate at the apex.

### POTAMOGETONACEAE. Pondweed Family

*Reference:* Norman Taylor, Zannichelliaceae, N. Amer. Fl. 17: 13–27. 1909; Cymodoceaceae, loc. cit. 31–32.



Plants aquatic, glabrous, growing in fresh or salt water, the stems usually very slender, simple or branched; leaves petiolate or sessile, capillary or expanded into a distinct, narrow or broad blade, entire; flowers very small, perfect or monoecious, in sessile or pedunculate spikes, or clustered in the leaf axils; perianth none, the flowers sometimes enclosed in a hyaline sheath; androecium of 1-4 stamens; anthers extrorse, 1-2-celled, the connective sometimes petaloid; gynoecium of 1-4 distinct 1-seeded carpels; fruits usually nut-like or drupe-like, sessile or stipitate; endosperm none.

Genera about 9, the species widely distributed in tropical and temperate regions. Except for *Potamogeton*, the genera are all small, with only 1-6 species each. At least one other member of the family, *Zostera marina* L., has been found in Central America, in salt water along the coast of Honduras, and it is to be expected along the coasts of Guatemala. *Zannichellia* also might well be found in Guatemala.

Gynoecium of one carpel. . . . . *Diplanthera*

Gynoecium of several distinct carpels.

Flowers umbellate, on long slender pedicels; stamens 2; connective of the anther not dilated; leaves narrowly linear. . . . . *Ruppia*

Flowers spicate, sessile; stamens 4; connective of the anther dilated and perianth-like; leaves almost filiform to oblong or oval. . . . . *Potamogeton*

## DIPLANTHERA Thouars

Submerged marine perennial plants, forming colonies with creeping rootstocks, rooting at the nodes of the articulated rootstocks; leaves linear, grass-like, more or less sheathing at the base; flowers dioecious; perianth none; staminate flower consisting of 2 anthers attached to the end of a long pedicel, the pedicels sheathed at the base; anthers unequally attached, one higher than the other, 2-celled; pistillate flowers consisting of a single naked carpel; style short, crowned with a slender, solitary stigma; mature fruit small, globose.

Only one species is known.

***Diplanthera Wrightii*** (Aschers.) Aschers. in Engler & Prantl Nat. Pfl. Nacht. 37. 1897. *Halodule Wrightii* Aschers. Sitz.-ber. Ges. Nat. Freunde Berlin 1868: 19. 1868; Bot. Zeit. 26: 511. 1868.

Submerged in salt water adjacent to the seashore, at sea level; Izabal (Bay of Santo Tomás and vicinity of Punta Palma near Puerto Barrios). Southeastern United States (North Carolina to Florida); Mexico; West Indies.

Leaves linear, flat, acute, ligulate at base, 3-40 cm. long, less than 1 mm. wide; stipular sheaths scarious, scarcely 3 cm. long; staminate flower of 2 anthers at the end of a long pedicel; anthers 2-celled, about 6 mm. long; pistillate flower of 1 naked carpel about 3 mm. long; style short; stigma solitary, slender; mature fruit black.

## POTAMOGETON L. Pondweed

*References:* J. O. Hagström, Critical researches on the Potamogetons, Svensk. Vet. Akad. Handl. 55, no. 5: 1-281. f. 1-118. 1916. M. L. Fernald, The linear-leaved North American species of *Potamogeton*, section *Axillares*, Mem. Amer. Acad. 17: 1-183. pls. 1-40. 1932. E. C. Ogden, The broad-leaved species of *Potamogeton* of North America north of Mexico, Rhodora 45: 57-105, 119-163, 171-216. illus. 1943.

Plants perennial, submerged or floating, the stems simple or branched, the ends of the stems often producing propagating buds; leaves usually of two kinds, floating and submerged, narrow or broad; floating leaves usually rather thick, generally expanded into a true blade; submerged leaves sometimes reduced to terete phyllodia but usually with broad or very narrow blades; stipules adnate to the leaf bases or free from them; inflorescences a simple or rarely branched spike, the flowers very small, green, crowded or the spikes sometimes interrupted; perianth none; stamens 4; anthers 2-celled, the connective enlarged and petaloid; carpels 4, distinct, sessile; ovules solitary in each cell; fruit an indehiscent nutlet; embryo completely or partially coiled into a circle.

About 60 species, widely distributed, chiefly in temperate regions, few in tropical areas. Only the following species are known definitely from Central America.

Leaves broad, all or most of them 1-1.5 cm. wide.

Leaf blades cordate and clasping at the base . . . . . *P. perfoliatus*

Leaf blades acute to long-attenuate at the base . . . . . *P. illinoensis*

Leaves very narrow, all or most of them 3 mm. wide or narrower.

Stipules adnate to the leaf bases . . . . . *P. pectinatus*

Stipules free from the leaf bases.

Leaves usually without basal glands; peduncles usually 1 cm. long or shorter; fruiting spikes subcapitate or densely short-cylindric, 2-6-flowered; fruits with a conspicuous acute dorsal keel . . . . . *P. foliosus*

Leaves often with a pair of basal glands; peduncles mostly 1.5 cm. long or longer; fruiting spikes interruptedly cylindric, with 2-5 remote whorls of flowers; fruits rounded dorsally or very obscurely keeled . . . . . *P. pusillus*

**Potamogeton foliosus** Raf. Med. Rep. Hex. 2, 5: 354. 1808.

At 900 meters; Sololá (Finca Mocá, *J. Bequaert* 53). Widely distributed in North America; Mexico; West Indies.

Plants wholly immersed, the stems very slender, a meter long or less, freely branched; leaves narrowly linear, slightly attenuate to the base, acute or subacute, usually without basal glands, the primary ones 0.3-2.7 mm. wide, 1-5-nerved; stipules forming tubular, delicately fibrous, blunt sheaths, 3-18 mm. long; peduncles slightly thickened above, mostly 3-10 mm. long; spikes subcapitate or thick-cylindric, at maturity 2-5 mm. in diameter, usually with 2-3 approximate whorls of 2 flowers each; fruits obliquely suborbicular or obovoid, compressed, 1.8-2.5 mm. long, with a thin or acute, undulate or strongly dentate dorsal keel.

The single known Guatemalan collection was determined and cited by Fernald in the monograph cited above.

**Potamogeton illinoensis** Morong, Bot. Gaz. 5: 50. 1880. *P. fragillimus* Hagstr. Svensk. Vet. Akad. Handl. 55, no. 5: 202. 1916 (type from Laguna de Ayarza, Santa Rosa, *Heyde & Lux*). *Yacchian* (Huehuetenango).

Submerged or floating in slow streams or in lakes or ponds, 2400 meters or lower; Petén; Alta Verapaz; Izabal; Jalapa; Jutiapa; Santa Rosa; Guatemala; Sololá; Huehuetenango. Widely distributed in temperate North America; Mexico; West Indies.

Stems slender, simple or branched; submersed leaves thin, elliptic or oblong-elliptic to lanceolate or linear, the blades 5–20 cm. long, 1.5–4 cm. wide, sessile or petiolate, acute and usually somewhat mucronate at the apex, 9–17-nerved; floating leaves present or absent, somewhat coriaceous, elliptic or oblong-elliptic, 4–13 cm. long, 2–6.5 cm. wide, obtuse and mucronate at the apex, cuneate or rounded at the base, on petioles 2–9 cm. long, 13–29-nerved; stipules persistent, divergent and conspicuous, obtuse, those of the submersed leaves 2.5–8 cm. long; peduncles 4–15 cm. long; spikes at anthesis of 8–15 whorls of flowers, in fruit cylindric and crowded, mostly 3–6 cm. long, 8–10 mm. thick; fruits obovate to orbicular or ovate, 2.7–3.5 mm. long, conspicuously carinate.

The plant has been reported from Guatemala as *P. lucens* L., *P. Zizii* Roth, and *P. malaianus* Miq. It is infrequent but sometimes locally abundant. Apparently it varies from season to season in a given locality. In 1939 the senior author found it abundant in a small sluggish black stream near San Cristóbal, Verapaz, at a time when it was impossible to reach the plants with any means at hand. In 1941, at the same season, he returned to the spot intending to procure specimens, but was unable to find a single plant where two years before the species had been so plentiful.

**Potamogeton pectinatus** L. Sp. Pl. 127. 1753.

In water of lakes, 1200–1800 meters, or lower. Guatemala (Lago de Amatitlán); Sololá (Lago de Atitlán). Widely distributed in temperate regions of both hemispheres; Mexico; British Honduras.

Stems slender, submerged, usually much branched; leaves all submerged, linear or capillary, usually very numerous and often fasciculate, mostly 2–15 cm. long and 3 mm. wide or less, rounded or obtuse at the apex and mucronate, 1–5-nerved; stipules adnate to the leaf bases, pale, the sheath 1–2 cm. long, the free portion of the stipules shorter, scarious; spikes long-pedunculate, the peduncles mostly 5–12 cm. long; spikes 1–4 cm. long, usually much interrupted, with numerous whorls of flowers, the whorls sometimes 1 cm. apart; fruits somewhat 3-carinate, 2.5 mm. long or even larger.



Two forms of this species are found in Guatemala. That of Lago de Atitlán is the ordinary widespread form of the species. The plant of Amatitlán has much broader leaves, giving the plant a decidedly different appearance, and some of these specimens have been determined by Fernald as *P. striatus* Ruiz & Pavón. Hagström considers this referable to *P. pectinatus*, calling it var. *striatus* (Ruiz & Pavón) Hagström of that species. As represented in Guatemala the two plants are so unlike that it seems probable that Fernald is correct in treating *P. striatus* as a distinct species.

**Potamogeton perfoliatus** L. Sp. Pl. 126. 1753. *P. bupleuroides* Fernald, Rhodora 10: 46. 1908. *P. perfoliatus* var. *bupleuroides* Farwell, Amer. Midl. Nat. 8: 264. 1923.

At about 1800 meters; Sololá (Lago de Atitlán). Widely distributed in temperate North America; Eurasia.

Stems elongate, often much branched, submerged; leaves all submersed, thin and delicate, sessile, orbicular to ovate-lanceolate, mostly ovate, 1–6 cm. long, 0.5–3 cm. wide, 7–21-nerved, cordate and clasping at the base, rounded or very obtuse at the apex; stipules delicate, fugacious, ovate-oblong, rounded at the apex, 2 cm. long or shorter; peduncles 1–9 cm. long, about as thick as the stems; spikes with 2–8 whorls of flowers, not crowded at anthesis, in fruit 1–2 cm. long and 8 mm. thick; fruits obovate, rounded dorsally, plump when mature, about 2.5 mm. long, with a prominent beak 0.7 mm. long.

The Guatemalan material is referable to var. *bupleuroides*.

**Potamogeton pusillus** L. Sp. Pl. 1: 127. 1753. *Potamogeton panormitanus* Bivona-Bernardi, Nuov. Piant. 6. 1938. *P. panormitanus* var. *major* G. Fischer, Bericht. Bayer. Bot. Gesell. 11: 109. 1907.

In ponds or small lakes, 2400 meters or lower; Quiché; Huehuetenango. Widely distributed in temperate regions of both hemispheres; southern Mexico; British Honduras; Cuba.

Stems capillary, sometimes a meter long or more, usually much branched, the branches and their short lateral branchlets often terminated by winter buds; leaves linear or linear-setaceous, usually with a small translucent gland at the base, 1–7 cm. long, 3 mm. wide or narrower, acute or obtuse, generally 3-nerved; stipules scarious-membranaceous, slender-tubular, their margins united to above the middle, 6–17 mm. long; peduncles filiform throughout, 1.5–8 cm. long; spikes elongate, much interrupted, 6–12 mm. long, of 3–5 distant few-flowered whorls; fruits light olivaceous, obliquely obovoid, usually somewhat sigmoid, 2–2.8 mm. long, often deeply impressed on the somewhat flattened sides, the dorsal surface with a very low and broad, obscure keel.

## RUPPIA L.

Plants perennial, submerged, growing in salt or fresh water, the stems very slender, simple or usually branched; leaves alternate, linear, entire, 1-nerved, acute, slightly dilated and sheathing at the base; stipular sheaths clasping the leaf bases; flowers perfect, terminating a spadix-like peduncle; perianth none, the flowers often enclosed in the sheathing leaf bases at first; stamens 2, the anthers sessile, 2-celled; carpels of the ovary 4, sessile at first, becoming stipitate; stigmas sessile or at the end of a long or short style, peltate; mature fruits terminating a long slender pedicel, the pedicels umbellate, recoiling after the fruit falls; fruits oblique or symmetric, crowned by the style; embryo curved, ovoid.

Species 1, or perhaps more numerous, widely dispersed in temperate and tropical regions.

### *Ruppia maritima* L. Sp. Pl. 127. 1753.

Forming large submerged beds in shallow, salt or brackish water, at sea level, or in fresh-water lakes at an elevation of 1800 meters. Izabal (Río Dulce; Bahía de Santo Tomás); Sololá (Lago de Atitlán); Retalhuleu (Champerico). Mexico; British Honduras; El Salvador; Honduras; Costa Rica; widely distributed in temperate and tropical regions of both hemispheres.

Plants often densely branched; leaves narrowly linear or almost filiform, 2–10 cm. long, scarcely 0.5 mm. wide; stipular sheaths 6–10 mm. long; flowers on a short pedicel at first, this elongating in age and forming a loose spiral; stamens without a filament, early deciduous; mature carpels ovoid, often gibbous and somewhat oblique, 2 mm. long; style short and stout or somewhat attenuate, straight or uncinate; pedicels of the fruits becoming 1.5–3 cm. long.

One Guatemalan collection reported as *Zannichellia palustris* L. is actually referable rather to *Ruppia maritima*.

## NAJADACEAE

*Reference:* Norman Taylor, N. Amer. Fl. 17: 33–35. 1909.

Submerged aquatic herbs of fresh or salt water, with fibrous roots and very slender, branched stems, the internodes sometimes spinulose; leaves alternate, opposite, or verticillate, linear, spinose-dentate, sometimes mucronate, sheathing at the base; sheaths rounded or auriculate; flowers minute, monoecious or dioecious, solitary in the leaf axils; staminate flowers with a double perianth-like envelope, the inner hyaline, the outer 4-horned or entire; stamen 1, sessile, the anthers 1–4-celled; pistillate flowers consisting of a single pistil, the style short or wanting, the stigmas 2–4, sometimes mingled with 1–3 sterile subulate stigmoid processes; fruit a sessile drupelet, its solitary seed filling the pericarp; embryo straight.

The family consists of a single genus.

## NAJAS L.

A small group of about 10 species, generally distributed in temperate and tropical regions of both hemispheres. One other species, *N. marina* L., with relatively broad and deeply dentate leaves and dioecious flowers, has been collected in El Salvador, and is to be expected in Guatemala. Among Central American aquatic plants with linear leaves, the local species may be recognized at once by their toothed leaf margins.

Leaves almost entire or very finely serrulate with minute subulate teeth.

*N. guadalupensis*

Leaves conspicuously serrulate with triangular teeth.....*N. Wrightiana*

***Najas guadalupensis*** (Spreng.) Morong, Mem. Torrey Club 3, pt. 2: 60. 1893. *Caulinia guadalupensis* Spreng. Syst. Veg. 1: 20. 1825.

In lakes, ponds, or small pools, sometimes in running water, ascending from near sea level to about 2400 meters; Petén; Zacapa; Chiquimula; Jalapa; Jutiapa; Escuintla; Guatemala; Sololá; Quiché; Huehuetenango. United States and Mexico to British Honduras and El Salvador; West Indies.

Stems slender and much branched, often forming dense tangled masses; leaves all submerged, 10–25 mm. long, 0.5–1.5 mm. wide, acute or obtuse, usually tipped with 1–2 small spines, sheathing at the base but not auriculate, the marginal teeth small and inconspicuous, spinulose; flowers monoecious, the staminate 2–3 mm. long, with 4-celled anthers; pistillate flowers 2–3 mm. long; mature fruit tipped with 2–3 stigmas and usually with 1–2 spinulose sterile stigmatic processes, thus appearing to have 3–5 stigmas; seed ellipsoid, reticulate, with numerous quadrangular areolae.

***Najas Wrightiana*** A. Br. Sitzb. Ges. Naturf. Fr. Berl. 17. 1868. *N. multidentata* Koch, Ber. Schweiz. Bot. Gesell. 44: 341. 1935 (type from Punta Gorda, British Honduras, *W. A. Schipp* 991). *N. Wrightiana* subsp. *Wrightiana* R. T. Clausen, Bull. Torr. Bot. Club 73: 364. f. d. 1946. *N. Wrightiana* subsp. *multidentata* R. T. Clausen, loc. cit. 365.

In lakes, swamps, small ponds, and sometimes in running water, at 300 meters or less; Petén; Huehuetenango (Ciénaga de Lagartero). Eastern Mexico; British Honduras; West Indies; Brazil.

Stems slender and much branched, often forming dense tangled masses; leaves all submerged, in dense fascicles, widely spreading, 10–25 mm. long, 0.4–0.9 mm. wide, acuminate, tipped with a single spine, conspicuously sheathed with a broad rounded base, the marginal teeth conspicuous, triangular, 15–40; flowers monoe-



cious, the staminate with a single 4-celled anther; pistillate flowers ovoid; mature fruit tipped with 2 stigmas and without sterile stigmatic processes; seed narrowly ellipsoidal, reticulate with numerous quadrangular areolae, 1–1.4 mm. long.

According to Clausen's treatment, all the material from British Honduras and Guatemala, with 25–40 teeth on the margin of the relatively broader leaves, is included under *Najas Wrightiana* subsp. *multidentata*, while the plants of Cuba and the Mexican coastal plain fall under *Najas Wrightiana* subsp. *Wrightiana*.

### ALISMATACEAE. Water-plantain Family

*References:* Fr. Buchenau, Alismataceae, Pflanzenreich IV. 15: 1–66. 1903; J. K. Small, Alismaceae, N. Amer. Fl. 17: 43–62. 1909.

Herbs, aquatic or growing in wet soil, mostly perennial, lactescent; leaves usually all basal, petiolate, sheathing at the base, the blades linear to oval, hastate or sagittate, parallel-nerved; flowers perfect or polygamous, very rarely dioecious, borne upon a scape, usually pedunculate and arranged in bracteate whorls; perianth 6-parted, usually with a distinct division into calyx and corolla; sepals 3, free, imbricate in bud, generally persistent; petals 3, imbricate in bud, thin and delicate, white, fugacious; stamens 3 or multiples of 3, verticillate or spirally inserted, the filaments filiform or dilated; anthers 2-celled, affixed at or near the base, dehiscent by lateral longitudinal slits or sometimes extrorse; carpels 3 or in multiples of 3, verticillate or capitate upon a convex receptacle, free, 1-celled, usually 1-ovulate; styles terminal, the stigmas usually capitate; fruits as many as the ovaries, free, mostly 1-seeded, coriaceous, indehiscent; seeds mostly solitary and basilar, ascending, with thin testa, smooth or rugose; endosperm none, the embryo hippocrepiform.

Twelve genera are known, widely dispersed in temperate and tropical regions of both hemispheres. Only the following genera are known in Central America.

Flowers in only 2–3 whorls; leaves deeply cordate at the base, the nerves very inconspicuous or almost obsolete; flowers polygamous (perfect and staminate).....*Lophotocarpus*

Flowers usually in numerous whorls; leaves attenuate to cordate at the base, conspicuously nerved; flowers not polygamous, but either all perfect or else staminate and pistillate upon the same plant.

Flowers either staminate or pistillate, both kinds on the same plant; leaves attenuate at the base or sagittate.....*Sagittaria*

Flowers all perfect; leaves acute or cordate at the base, never sagittate.  
*Echinodorus*

### ECHINODORUS L. Richard

*Reference:* N. C. Fassett, *Echinodorus* in the American tropics. Rh. 57: 133–158. 1955.

Perennial or annual herbs, growing in water or wet soil; leaves ovate-rounded to almost linear, attenuate to cordate at the base; inflorescence of few to many

whorls of flowers, often paniculate, the flowers sessile or pedunculate, perfect; sepals herbaceous, usually coriaceous, costate-striate, persistent, after anthesis recurved, spreading, or appressed, sometimes accrescent; petals delicate, fugacious; stamens 9 to many, the filaments linear, the anthers oblong, attached dorsally above the base, dehiscent by lateral slits; carpels usually numerous, 1-ovulate, forming a dense head, the style terminal; fruit heads mostly spheric or ovoid, sometimes echinulate, the fruits scarcely compressed, their sides costulate and sometimes glandular; seeds smooth or punctate.

About 20 species are known, two in Europe and Africa, the others in temperate and tropical America.

Carpels 20 or fewer in a loose head; stamens 6 or 9; anthers basifixed; stylar beak of nutlet 0.5 mm. or less long or obsolete.

Nutlet with 3 smooth ridge-like facial ribs; blade of leaves linear-lanceolate to elliptic, tapered at base. . . . . *E. tenellus*

Nutlet with 1-several crested ribs; blade of emerged leaves ovate and deeply cordate. . . . . *E. nymphaeifolius*

Carpels many in a dense head; stamens 9-30; anthers versatile; nutlet with well-developed beak.

Leaves with blades cordate at base, stellate-pubescent at base of blade and summit of petiole. . . . . *E. grandiflorus*

Leaves with blades tapered to truncate at base, glabrous. . . . . *E. Andrieuxi*

**Echinodorus Andrieuxi** (Hook. & Arn.) Small, N. Am. Fl. 17, pt. 1: 46. 1909. *Alisma Andrieuxi* Hook. & Arn. Bot. Beech. Voy. 311. 1837. *Echinodorus ellipticus*  $\gamma$  *ovata* Micheli in DC., Monogr. Phan. 3: 52. 1881.

Open or brushy marshes of the Oriente, 400-900 meters; Chiquimula; Jutiapa. Western Mexico; British Honduras; El Salvador; Nicaragua.

A coarse stout perennial, sometimes a meter high but usually lower, with thick erect rhizomes, the scapes striate and angulate; leaves few or numerous, on long, marginate or winged petioles, the blades shorter than the petioles, lanceolate to elliptic, as much as 35 cm. long and 14 cm. wide but usually smaller, acute or short-acuminate, acute or cuneate at the base, with 3-5 or sometimes 5 elevated nerves, not punctate; inflorescence simply spicate or spicate-paniculate, usually large, the whorls of flowers usually numerous, separated, the bracts lanceolate, long-acuminate; peduncles stout, 5-15 mm. long or sometimes even shorter; sepals broadly ovate, coriaceous, costate-striate, erect and somewhat enlarged in fruit; stamens 20-24; fruit heads ovoid, mostly 8-10 mm. long, echinate; carpels rostrate, 6-8-costulate.

**Echinodorus grandiflorus** (Cham. & Schlecht.) Micheli in DC. Monogr. Phan. 3: 57. 1881. *E. grandiflorus*  $\gamma$  *floribundus* Micheli, loc. cit. *Alisma grandiflorum* Cham. & Schlecht. Linnaea 2: 132. 1827. Figure 17.



FIG. 17. *Echinodorus grandiflorus*. a, Inflorescence ( $\times \frac{1}{2}$ ). b, Flower ( $\times 4$ ). c, Leaf ( $\times \frac{1}{2}$ ).



In shallow water of swamps or at edges of lakes and streams, 600 meters or less; Izabal; Chiquimula; Jutiapa; Santa Rosa. Honduras to Panama; Cuba; South America.

A coarse perennial, often a meter high or more, with short thick rhizomes, the scapes angulate, sometimes sparsely muricate or pubescent; emerged leaves erect, long-petiolate (except in individuals from dry soil), densely pellucid-punctate, the blades ovate-rounded or broadly ovate, sometimes 50 cm. long and 40 cm. wide but usually smaller, 13-17-nerved, obtuse, at the base truncate to rather deeply cordate, with rounded basal lobes, glabrous or often more or less muricate or pubescent beneath on the nerves, the base of blade and summit of petiole stellate-pubescent; inflorescence large, simple or often much branched, the whorls of flowers few or numerous, remote, many-flowered, the peduncles long and slender, mostly 1.5-4 cm. long; bracts ovate, long-acuminate; sepals ovate, obtuse, striate-costate, spreading or appressed in fruit, scarcely accrescent; fruit heads globose, about 1 cm. broad, obscurely echinate; nutlets winged on the back, with 3-4 ribs that are sometimes slightly winged toward the summit, each side with usually 2 facial glands that are elongate and rounded at both ends and are placed well below the summit of the nutlet, and a short stout beak.

**Echinodorus nymphaeifolius** (Griseb.) Buchenau, Bot. Jahrb. 2: 483. 1882. *Alisma nymphaeifolium* Griseb. Cat. Pl. Cuba 218. 1866. *Helianthium nymphaeifolium* Small, N. Amer. Fl. 17: 45. 1909.

Collected at Maskall Pine Ridge, *Gentle 1109*, British Honduras, and in Campeche, and doubtless occurring in Petén. Cuba.

Plants comparatively small, mostly 40 cm. tall or less; submersed leaves ribbon-like, thin and flaccid, 15-20 cm. long, about 1 cm. wide; emerged leaves on very long petioles, the blades thin, ovate or oblong-ovate to rounded-ovate, 3-12 cm. long, 1.5-9 cm. wide, 9-13-nerved, rounded at the apex, deeply and narrowly cordate at the base with scattered pellucid lines 0.2-0.8 mm. long; scapes solitary or several, the flowers forming a rather small but much branched erect ovate or conic panicle, the peduncles 1-2 cm. long, slender; sepals broadly ovate, 1-1.5 mm. long; petals scarcely as long as the sepals, suborbicular; fruit heads depressed, subtended by the persistent reflexed calyx; nutlets 1.4 mm. long, 1 mm. wide, with a beak 0.2 mm. long, flat-sided, with a broad crested keel, and with crested ribs and 1 or 2 long glands on each face, the ribs conspicuously cristate.

**Echinodorus tenellus** (Mart.) Buch. var. **latifolius** (Seubert) Fassett, Rhodora 57: 202. 1955. *Alisma tenellum* forma *latifolia* Seubert in Mart. Fl. Bras. 3, pt. 1: 195, pl. 13, fig. 2, nutlet and plant to left. 1848.

Bogs, swamps, and wet meadows, at elevations mostly between 500-1700 meters; Petén; Jalapa; Alta Verapaz. El Salvador and West Indies to Venezuela and southern Brazil.

Submersed leaves linear to oblong-ob lanceolate, 12-22 cm. long, thin and flaccid; emerged leaves smaller, rarely 10 cm. long, the blades only a few mm.

wide, linear-lanceolate to narrowly ovate; scape slender, 10 cm. or less tall, with the flowers in one or few whorls; flowers small; nutlet 1.4–1.8 mm. long, with 3 smooth ridges on each face; beak 0.2–0.5 mm. long.

## LOPHOTOCARPUS Durand

Perennial aquatic plants with long-petiolate, broad, deeply cordate leaves; scapes simple, the polygamous flowers borne in a few whorls of 2–3 long-pedunculate flowers, the upper flowers staminate, the lower ones perfect; stamens 9–15, the filaments compressed; carpels numerous, densely inserted upon a convex receptacle, achenes crowded and compressed, cristate or winged, the fruit head more or less enveloped by the large accrescent sepals.

As treated by Buchenau the genus consists only of the following species. North American authors usually refer to *Lophotocarpus* half a dozen plants of Mexico and the United States that Buchenau refers to *Sagittaria*, and which are conspicuously different in habit from *L. guayanensis*.

Bogin (Mem. N. Y. Bot. Gard. 9: 192. 1955) places *Lophotocarpus guayanensis* under *Sagittaria guayanensis*, referring the Guatemalan material to subsp. *guayanensis*.

**Lophotocarpus guayanensis** (HBK.) J. G. Smith, Rept. Mo. Bot. Gard. 6: 61. 1894. *Sagittaria guayanensis* HBK. Nov. Gen. & Sp. 1: 250. 1816.

In mud or shallow water, 1000 meters or less; Petén; Jutiapa; Santa Rosa. Mexico; Honduras; El Salvador; Panama; northern South America.

Plants sometimes submerged or floating; petioles often much elongate, always much exceeding the blades, nodose-septate; blades broadly ovate to rounded, 5–7 cm. long or shorter, obtuse to rounded and emarginate at the apex, deeply cordate at the base; scapes often shorter than the leaves, bearing only a few close whorls of large flowers; sepals broadly ovate, green, in fruit 8–11 mm. long; fruiting peduncles short and stout, often exceeded by the persistent bracts; fruit heads depressed-globose, 12–15 mm. broad; achenes obovate, 2–2.5 mm. long, short-rostrate, the sides tuberculate.

## SAGITTARIA L.

Plants perennial, growing in shallow water or wet soil, sometimes submerged and floating (not in Central American species), arising from thick or tuberous rhizomes; leaves long-petiolate, various in form; scapes simple, at least below the inflorescence, the flowers monoecious or dioecious, in whorls of 3, the flowers of the upper whorls usually staminate, the lower pistillate; stamens few or many; carpels

very numerous, distinct, crowded upon a convex or globose receptacle; achenes numerous, compressed, rostrate.

About 30 species in temperate and tropical regions of both hemispheres. In Central America only the following species are known.

Leaves mostly lanceolate or linear-lanceolate, long-attenuate to the base.

*S. lancifolia*

Leaves triangular-sagittate, with large, acute or acuminate basal lobes.

*S. latifolia*

### ***Sagittaria lancifolia* L. Pl. Jam. Pug. 27. 1759. Figure 18.**

In shallow water or in muddy soil about lakes or along streams, 600 meters or less; Alta Verapaz; Izabal; Jutiapa. Southern United States to Mexico and British Honduras; Honduras; Nicaragua; Costa Rica; Panama; West Indies; South America.

Plants large and coarse, glabrous, often a meter high or taller; leaves borne on long thick spongy petioles, erect, the blades lance-linear to elliptic, 20–50 cm. long, mostly 2–8 cm. wide, acute or acuminate, acute to long-attenuate at the base, conspicuously nerved; scapes simple or usually branched, the flowers on long slender spreading peduncles, the thin bracts lanceolate; corolla pure white, 2–4 cm. broad; fruit heads 1–1.5 cm. in diameter; achenes cuneate or obovate, short-rostrate, with a narrow dorsal wing.

Bogin refers material from Guatemala, British Honduras, Costa Rica, Nicaragua, Panama, Mexico, and eastern United States to subsp. *media* (Micheli) Bogin (Mem. N. Y. Bot. Gard. 9: 214. 1955).

### ***Sagittaria latifolia* Willd. Sp. Pl. 4: 409. 1806.**

In marshes, at or little above sea level; Izabal. Southern Canada and United States to Mexico; Honduras; Nicaragua; Costa Rica; West Indies; South America. Hawaii (where introduced).

Plants glabrous, usually 30–60 cm. tall; leaves long-petiolate, the blades narrowly or broadly triangular-sagittate, 10–40 cm. long, acute or acuminate, the large basal lobes acute to attenuate; scapes simple or branched, the peduncles 1–5 cm. long, slender, the bracts ovate; petals large and white; fruit heads 1.5–3 cm. in diameter; achenes very numerous, obliquely obovate, winged, with a horizontal apical beak.

Called “arrow-head” in the United States, in reference to the shape of the leaves. The starchy rhizomes were used as food by many of the North American Indians.

## **BUTOMACEAE**

*Reference:* Fr. Buchenau, Butomaceae, Pflanzenreich IV. 16. 1903.



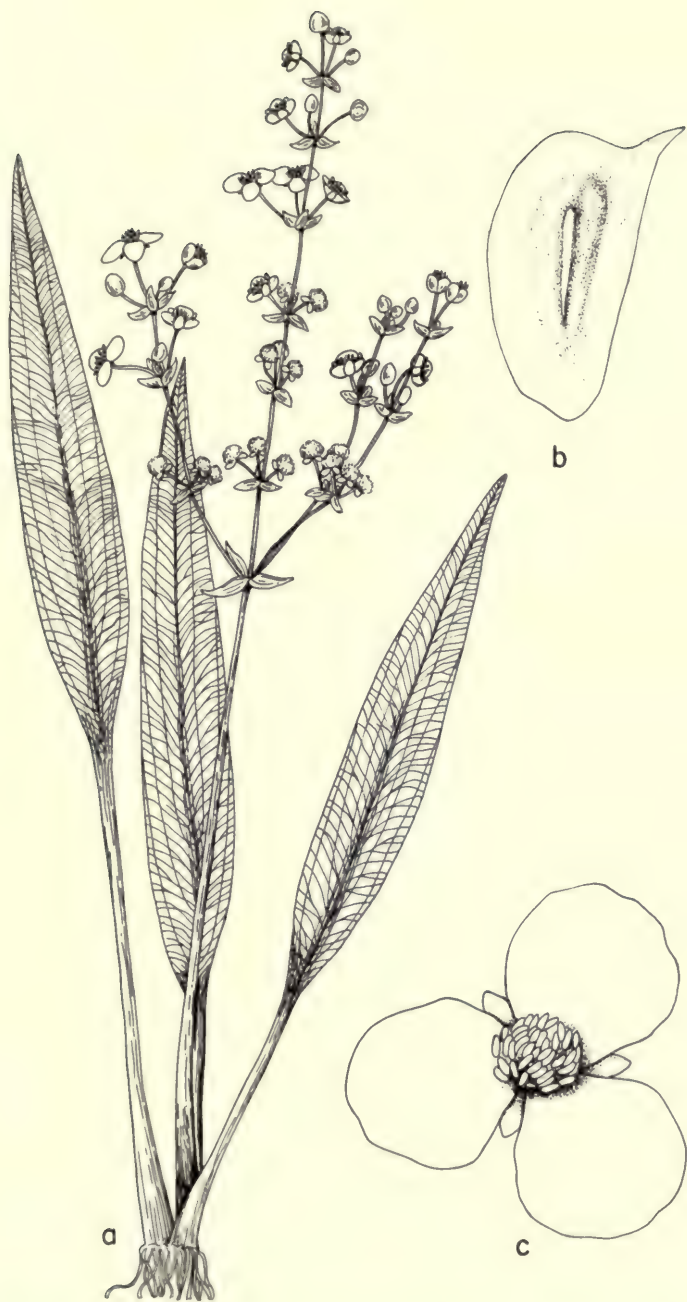


FIG. 18. *Sagittaria lancifolia*. a, Habit ( $\times \frac{3}{8}$ ). b, Achene ( $\times 27$ ). c, Staminate flower ( $\times 2\frac{1}{2}$ ).

Perennial or perhaps sometimes annual herbs, growing in water or wet soil, the sap usually milky; leaves usually all basal, the stems often scapiform; flowers conspicuous, regular, perfect; sepals 3, persistent, green; petals 3, generally larger than the sepals, mostly thin and fugacious; stamens free, hypogynous, either 9 or numerous and arranged in several verticels, the outer ones sterile; carpels of the ovary generally 6, sometimes numerous, the anthers 2-celled; ovules numerous in each cell, anatropous, inserted on the inner surface of the cell; style none or elongate; fruits as many as the carpels, free or more or less connate, the pericarp dry; seeds numerous, small, curved or straight; embryo hippocrepiform or straight; endosperm none.

Four genera and about a dozen species, in tropical and temperate regions of both hemispheres. Only the following are represented in tropical America.

Carpels of the ovary and fruit 6; stigma borne on a long style; leaves about as broad as long, rounded or cordate at the base. . . . . *Hydrocleis*

Carpels numerous; stigma sessile; leaves much longer than broad, attenuate at the base. . . . . *Limnocharis*

### HYDROCLEIS L. Richard

Herbs, usually growing in shallow water and with floating leaves, glabrous; leaves borne on very long petioles; scapes several or numerous, the flowers few or numerous, long-pedicellate, clustered at the end of the scape; sepals green, persistent; petals fugacious, yellow; stamens several or numerous, the outer ones without anthers, the filaments linear or lanceolate, the anthers basifixed, 2-celled, dehiscent by lateral longitudinal slits; carpels 3 or 6, lance-linear, subconnate at the base, attenuate into the style; fruits free, membranaceous, dehiscent along the inner side; seeds numerous, areolate-cristate.

About 4 species, in tropical America. Only the following is known in North America.

**Hydrocleis Standleyi** Steyermark in Standl. & Steyerm. Field Mus. Bot. 23: 31. 1944. Figure 19.

In shallow water, about 1000 meters; Jutiapa (type collected along railroad between Agua Blanca and Amatillo, *Steyermark 30416*); Sololá (Finca Mocá). Honduras; Guanacaste, Costa Rica.

Stems numerous from a short rootstock; petioles terete, 25–30 cm. long; blades of the floating leaves oval or broadly oblong, 4–6.5 cm. long, 3–4 cm. wide, rounded at the base and apex or shallowly cordate at the base; scapes 17–29 cm. long, umbellately 5–11-flowered, the bracts oblong-lanceolate or ovate-lanceolate, subacute or acute, 2–2.5 cm. long, the pedicels 3–5 cm. long; sepals lanceolate, subobtusate or subacute, 15–19 mm. long, 3.5–4 mm. wide, carinate dorsally; petals yellow, 6–7 mm. long, oblong-obovate; fertile stamens 6, the sterile ones 2–3; ovaries 3; follicles membranaceous, 12–13 mm. long; seeds brown, 0.8 mm. long.



FIG. 19. *Hydrocleis Standleyi* ( $\times \frac{3}{4}$ ).



## LIMNOCHARIS Humboldt & Bonpland

Plants growing in or at the edge of water, glabrous; leaves usually numerous, erect or ascending; stems naked, scapiform, the flowers umbellate at the apex; sepals persistent and embracing the fruit head; petals fugacious; stamens numerous, the outer one sterile, the filaments complanate; anthers basifixed, 2-celled, dehiscent by longitudinal lateral slits; carpels 15–20, verticillate, laterally compressed; style none, the stigma sessile, extrorse; follicles verticillate, scarcely coherent, laterally compressed, semicircular, membranaceous, sulcate dorsally, dehiscent internally; seeds very numerous, curved, transversely multicostate.

Two species, the other one described from Matto Grosso, Brazil.

***Limnocharis flava* (L.) Buchenau**, Abh. Nat. Ver. Bremen 2: 2. 1868. *Alisma flavum* L. Sp. Pl. 343. 1753. *Cebolla de chucho*.

At edge of a small pool, about 850 meters; Jutiapa (near Jutiapa, *Standley 74967*). Chiapas; Panama; West Indies; South America; naturalized(?) in the East Indies.

Plants perennial from a short thick erect rhizome, the scapes erect, 20–40 cm. high; leaves erect or ascending, not floating, often exceeding the scapes, long-petiolate, the petiole vaginate; leaf blades variable in shape, lanceolate to oblong-elliptic in Central American plants, sometimes broadly ovate in other regions, mostly 8–18 cm. long, acute to rounded at the apex, attenuate at the base; inflorescences umbelliform, 2–12-flowered, the pedicels 3–4 cm. long, somewhat dilated and trigonous above; flowers yellow, about 1.5 cm. broad, the sepals green, broadly ovate, obtuse; petals broadly ovate or suborbicular, longer than the sepals; mature follicles about 1 cm. long.

## HYDROCHARITACEAE

*Reference*: P. A. Rydberg, Elodeaceae, Hydrocharitaceae, N. Amer. Fl. 17: 67–74. 1909.

Aquatic herbs, floating or submerged, the stems much abbreviated or sometimes elongate and leafy; leaves linear or broader, sessile or petiolate; flowers regular, unisexual or rarely perfect, solitary within a tubular 2-fid or 2-parted spathe or subtended by 2 complicate bracts, the staminate sometimes more than 1 in the spathe; spathes sometimes borne on elongate scapes and emersed; calyx of 3 herbaceous or petaloid sepals; corolla of 3 thin petals, or wanting; stamens 3–12, the filaments distinct or united, the anthers linear, 2-celled; carpels of the ovary 3–15, united, the ovary 1-celled with several parietal placentae or 2–15-celled, the ovules numerous; styles or stigmas as many as the ovary cells; fruit baccate or utricular.

About 14 genera, in tropical and temperate regions. The genus *Elodea* has been found in El Salvador and may well occur in Guatemala.

Leaves petiolate, the blades ovate or rounded . . . . . *Limnobium*  
Leaves sessile, linear or ligular.

Fruit 1-celled, indehiscent; plants of fresh water . . . . . *Vallisneria*

Fruit 6–12-celled, dehiscent by valves; plants of salt water . . . . . *Thalassia*

**LIMNOBIUM** L. Richard

Plants usually floating, stoloniferous, the roots pendent in the water; leaves basal, petiolate, spongy-reticulate beneath; flowers dioecious or monoecious; staminate spathe pedunculate, bearing 2-3 long-pedicellate flowers; sepals 3, oblong; petals 3; stamens 6-12, distinct or united below, the anthers linear; pistillate spathe of 2 bracts, bearing a single short-pedicellate flower; ovary 6-9-celled; stigmas as many as the cells, 2-parted; fruit baccate, 1-9-celled, many-seeded.

The genus contains 3 or 4 other species, all American.

**Limnobium stoloniferum** (G. F. W. Mey.) Griseb. Fl. Brit. W. Ind. 506. 1861. *Hydromistria stolonifera* G. F. W. Mey. Fl. Esseq. 153. 1818.

Floating in lake, about 500 meters; Jutiapa (Lago de Güija, *Steyermark 31806*). West Indies; South America.

Plants producing abundant elongate stolons; leaves few or numerous, floating on the surface of the water and rosulate, the petioles spongy, 11-15 cm. long; leaf blades oblong-oval to rounded-oval, 4-6 cm. long, obtuse or rounded at the apex, acute at the base, entire; staminate sepals lanceolate, spreading; petals white, erect or spreading, linear-filiform, half as long as the sepals; filaments subulate, shorter than the anthers.

**THALASSIA** Solander

Marine herbs with elongate rootstocks; leaves clustered at the nodes of the rootstock, linear; scapes arising from the leaf clusters, the spathes tubular, 2-cleft; flowers dioecious, solitary; staminate flowers pedicellate, the perianth of 3 petaloid sepals; stamens 9, the filaments very short or obsolete, the anthers dehiscent laterally; pistillate flowers almost sessile in the spathe; ovary 6-12-celled; fruit stipitate, mammillate or echinate, dehiscent by valves.

One other species is known, in the Red Sea and Indian Ocean.

**Thalassia testudinum** König in König & Sims, Ann. Bot. 2: 96. 1805.

In salt water, Izabal; noted only about Puerto Barrios. Florida; Honduras; West Indies; northern South America.

Plants submersed, the base of the short stem covered by persistent remains of old leaves; leaves 2-5, sheathing at the base, linear-ligulate, mostly 40 cm. long or less, 6.5-11 mm. wide, rounded at the apex; scapes solitary; lobes of the spathe elliptic, papillose-dentate on the margins; perianth lobes oblong, 10-12 mm. long, rounded at the apex; anthers linear, 8 mm. long; stigmas 9-12, linear-fusiform, pilose, 1 cm. long; fruit ellipsoid-fusiform, short-stipitate, short-rostrate, mammillate.

This and other phanerogamic plants of salt water are seldom collected and little herbarium material of them is available. They

probably are much more abundant and common than one might infer from the specimens found in herbaria. They often are cast upon the beach after storms.

### VALLISNERIA L. Tape-grass

Submerged perennial plants of fresh water, acaulescent or nearly so, with stoloniferous rootstocks; leaves all basal, linear; staminate flowers numerous, crowded on a spadix, enclosed in a 2-3-parted spathe, at maturity detached and floating on the surface of the water; perianth of 3 sepals; stamens 1-3, usually 2; pistillate flowers solitary at the end of a long slender scape, floating on the surface of the water, subtended by a tubular 2-cleft spathe; sepals and petals each 3; ovary 1-celled, with 3 parietal placentae; stigmas 3- and 2-lobate; ovules numerous, orthotropous; fruit cylindric, indehiscent.

Probably two species, one American, the other European and Asiatic.

**Vallisneria americana** Michx. Fl. Bor. Am. 2: 220. 1803.  
Figure 20.

In fresh-water streams or lakes, at or little above sea level; Petén; Izabal. Temperate North America; Honduras.

Leaves thin, 10-50 cm. long, 3-8 mm. wide, obtuse or subacute, usually minutely denticulate toward the apex; staminate peduncles 1-5 cm. long, the spathe ovoid, 8-10 cm. long; pistillate peduncles thread-like, 30-60 cm. long, in age spirally twisting and drawing the fruit under water; spathe tubular, 1-1.5 cm. long; hypanthium in flower 1-2 cm. long, in fruit 5-12 cm. long; sepals elliptic, 2-3 mm. long; petals minute; stigmas sessile, 2-cleft.

Well known in the United States under the name "wild celery." The plants are a favorite food of at least some kinds of wild ducks, and are supposed to impart a particularly good flavor to the flesh of birds feeding upon them. The canvasback ducks of Chesapeake Bay, Maryland, have long been famous among epicures on this account.

The American material differs from the Old World *V. spiralis* L. chiefly in the staminate inflorescence, the staminate spathe of the American plants being shorter and thicker than that of the European and Asiatic plants. Possibly the American material should be treated as a variety of the Old World species, in which case the name would be *V. spiralis* var. *americana* (Michx.) Torr.

### TRIURIDACEAE

*Reference:* Hanns Giesen, Triuridaceae, Pflanzenreich IV. 18. 1938.



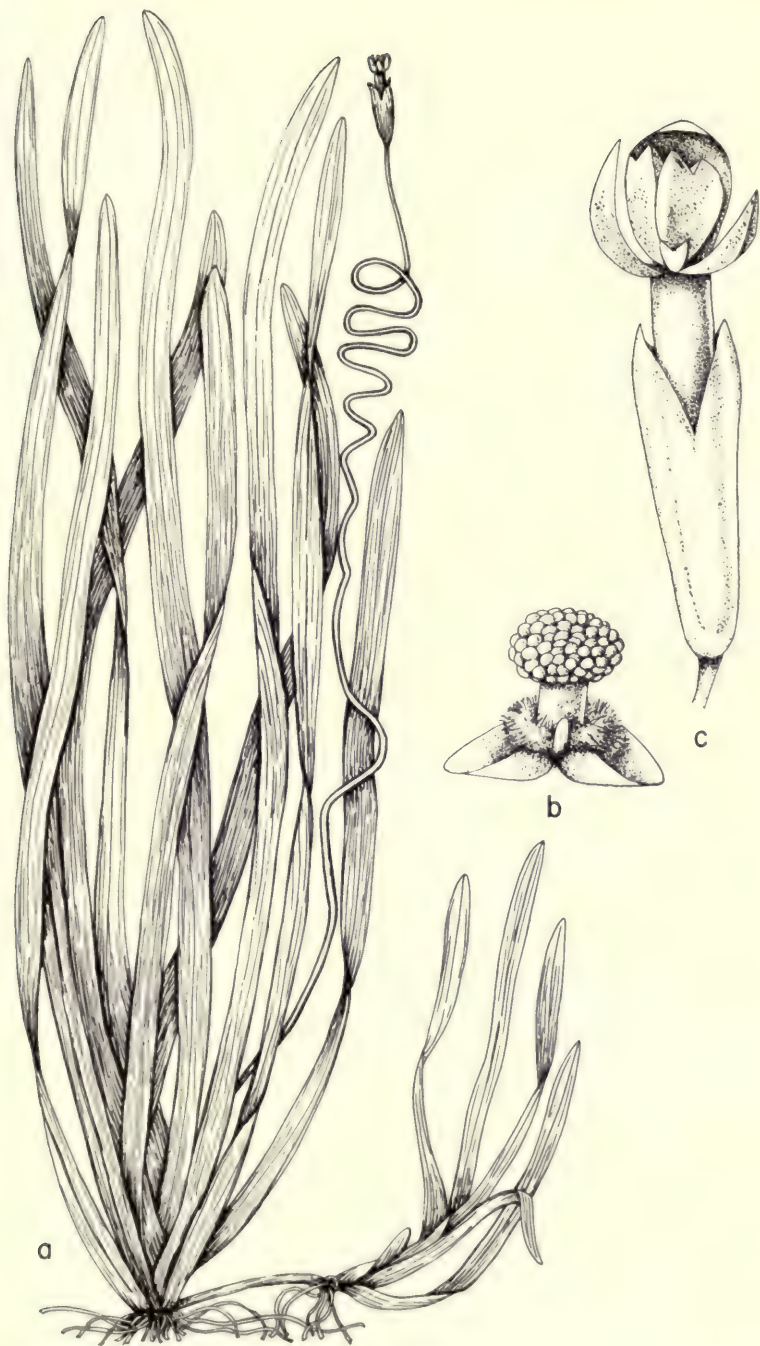


FIG. 20. *Vallisneria americana*. a, Habit ( $\times \frac{1}{2}$ ). b, Staminate flower ( $\times 50$ ). c, Pistillate flower ( $\times 3$ ).

Small, simple or branched, saprophytic herbs, without green coloring; leaves reduced to scales; flowers mostly minute, monoecious, dioecious, or perfect, the inflorescence racemose or sympodial; perianth 3–10-parted, the segments equal or alternately unequal, often caudate or barbate at the apex, valvate in bud; stamens 2, 3, 4, or 6 in the staminate flower, inserted on a flat or convex receptacle, the filaments short and connate at the base or none; anthers 2–4-celled, the cells finally confluent, dehiscent by longitudinal or transverse slits; pistillate flower without stamens or staminodia, the carpels of the ovary numerous, inserted on a more or less convex receptacle, smooth or papillose; mature carpels usually vertically dehiscent; style terminal, lateral, or basal, subulate or clavelliform, sometimes penicillate-papillose at the apex; seed ellipsoid; perfect flowers with a variable number of stamens, the filaments short, not connate, the anthers 3–4-celled, the carpels numerous, like those of the pistillate flower.

Seven genera and about 80 species, in the tropics of both hemispheres. Only the following genera are represented in Central America.

Perianth segments 4.....*Soridium*

Perianth segments of a different number from 4 in American species.

Perianth segments long-caudate; flowers dioecious.....*Triuris*

Perianth segments not caudate; flowers monoecious.....*Sciaphila*

### SCIAPHILA Blume

Roots usually pilose, slender; stems slender, erect, irregularly flexuous, glabrous; inflorescence racemose, the pedicels alternate; flowers monoecious, perfect or unisexual; perianth segments 6 in the Guatemalan species; stamens 6 in the local species; anthers 3–4-celled, the connective not produced; carpels of the ovary numerous, the style penicillate, papillose, or glabrous at the apex.

Species about 45, in the tropics of both hemispheres. One other Central American species is known from Panama. In spite of their usual scarcity locally, and the fact that the plants grow in sheltered places from which one would suppose dispersal of the minute seeds would be difficult, some of the species of this and other genera seem to have a very wide distribution.

*Sciaphila picta* Miers, Trans. Linn. Soc. 21: 48. 1852. Figure 21.

Wet dense forest, usually among rotting leaves, at or near sea level; Izabal. Atlantic coast of Honduras; Panama; Colombia.

Plants mostly 8–15 cm. high, coral-red, or the flowers dark red; leaves bract-like, ovate and clasping, 2–2.5 mm. long; racemes 4–13 cm. long, many-flowered, secund, laxly 10–30-flowered; bracts about 1.5 mm. long, ovate, acute; pedicels 2–3 mm. long, decurved; staminate flowers none; perfect flowers 2–2.5 mm. broad; perianth segments 6, equal, ovate-lanceolate, subobtuse, obscurely barbate at the apex; stamens 6, opposite the perianth segments, the filaments very short; carpels

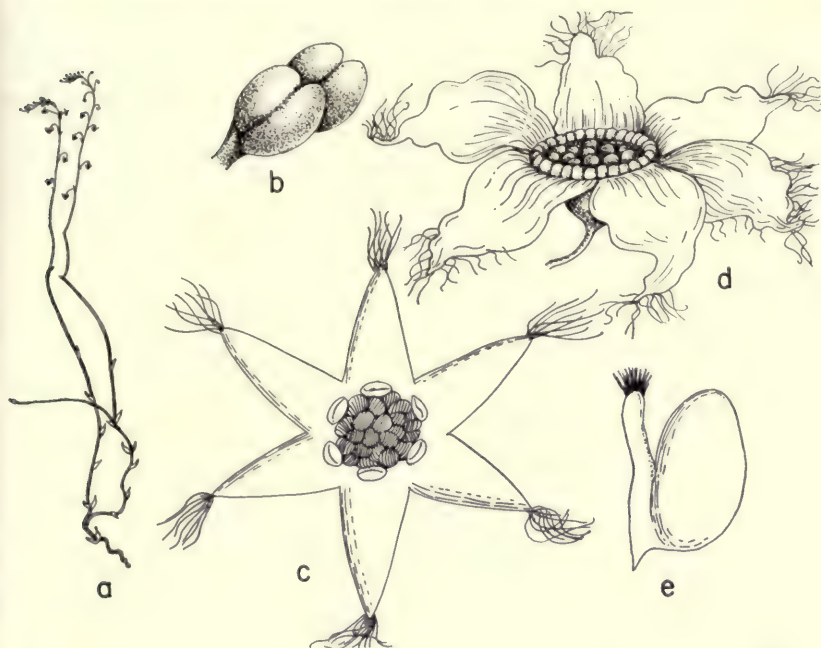


FIG. 21. *Sciaphila picta*. a, Habit ( $\times \frac{1}{2}$ ). b, Stamen ( $\times 117$ ). c, Flower, from above ( $\times 23$ ). d, Flower, lateral view ( $\times 23$ ). e, Pistil ( $\times 117$ ).

of the ovary 10–15, the style lateral, penicillate-papillose at the apex, longer than the carpel.

### SORIDIUM Miers

Small slender erect plants with more or less flexuous stems, the flowers racemose, alternate; perianth segments 4; stamens 2 in the staminate flower, opposite 2 opposing perianth segments, sessile or nearly so; anthers 2-celled, dehiscent by a transverse and an apical slit; carpels of the ovary numerous in the pistillate flower, the style lateral, smooth and obtuse or sometimes penicillate-papillose at the apex; fruit indehiscent.

Two species are known, the other in British Guiana.

**Soridium Spruceanum** Miers, Trans. Linn. Soc. 21: 50. 1852.

Dense wet forest, usually among rotting leaves, at or little above sea level; Izabal (along Río Frío, Steyermark 39899, 39897). British Honduras; Venezuela, Guianas, and northern Brazil.

Plants slender, simple, 5–25 cm. high, white throughout; leaves bract-like, 3 mm. long, narrowly lanceolate, acute; racemes 1–8 cm. long, laxly 10–30-flowered, not secund; bracts 2.5–4 mm. long, narrowly lanceolate; pedicels 1.5–2.5 mm.



long, erect-spreading, not decurved; staminate flower 2 mm. broad, the segments equal, ovate, very minutely barbate at the apex, minutely papillose within; pistillate flower 2 mm. broad, the perianth segments like those of the staminate flower; carpels of the ovary about 20, verruculose above; style slightly longer than the carpels.

This has been reported from British Honduras as *Sciaphila picta* Miers.

### TRIURIS Miers

The genus consists of only the following species:

**Triuris hyalina** Miers, Trans. Linn. Soc. 19: 77. 1845. *T. brevistylis* Donn. Smith, Bot. Gaz. 16: 14. 1891 (type from Pansamalá, Alta Verapaz, 1,200 meters, *Tuerckheim 1384*).

Known in Guatemala only from the collection cited. Brazil.

Root slender, sparsely pilose, simple; stems 2.5–7.5 cm. high, simple or branched from the base, leafless; inflorescence sympodial; bracts lanceolate, acute, auriculate at the base; flowers dioecious; perianth segments of the staminate flower 3, ovate-triangular, contracted at the apex into a caudicle as much as 9 mm. long, the blade 5 mm. long; stamens 3, alternate with the perianth segments, immersed near the base of the rounded torus, sessile, the anthers 4-celled, dehiscent by longitudinal slits; pistillate perianth like that of the staminate flower; carpels very numerous, the style terminal, smooth, glabrous, longer than the carpel.

### CYPERACEAE. Sedge Family

*References:* Standley, The Cyperaceae of Central America, Field Mus. Bot. 8: 239–292. 1931; Hugh T. O'Neill, The sedges of the Yucatan Peninsula, Carnegie Inst. Wash. Publ. 522: 249–322. 1940.

Grass-like or rush-like plants, herbaceous, annual or perennial, often with rhizomes; stems (culms) slender, solid, triangular, quadrangular, terete, or compressed; leaves narrow and grass-like, with closed sheaths; flowers perfect or imperfect, arranged in spikelets, one in the axil of each glume, the spikelets solitary or clustered, containing one to many flowers; scales 2-ranked or spirally imbricate, persistent or deciduous; perianth hypogynous, composed of bristles or scales, rarely calyx-like, often wanting; stamens usually 1–3, the filaments slender or filiform, the anthers 2-celled; ovary 1-celled; ovule 1, erect; style 2–3-cleft or rarely simple; fruit an achene, lenticular, plano-convex, or trigonous.

One of the largest families of plants, distributed through almost all parts of the earth. The largest genus, *Carex*, is most abundantly represented in temperate and arctic regions, but many of the other large groups, such as *Cyperus* and *Scleria*, are best developed in the tropics. At least five additional genera are represented in other parts of Central America, and one or two of them might be found in Guatemala, although this is doubtful.

Pistillate flowers enclosed in a more or less inflated utricle.

Utricle enclosing a long uncinate bristle . . . . . *Uncinia*

Utricle enclosing only the pistil . . . . . *Carex*

Pistillate flowers not enclosed in a utricle, merely subtended by glumes.

Culms bearing a single spikelet.

Leaves all reduced to bladeless sheaths . . . . . *Eleocharis*

Blade-bearing leaves present.

Scales of the spikelets spirally imbricate; base of the style persistent.

*Bulbostylis*

Scales of the spikelets 2-ranked; base of the style not persistent.

*Abildgaardia*

Culms bearing more than a single spikelet.

Scales of the spikelets evidently 2-ranked; perianth none.

Spikelets with only one perfect flower, capitate . . . . . *Kyllinga*

Spikelets usually with 2 to many perfect flowers, if 1-flowered then not capitate . . . . . *Cyperus*

Scales spirally imbricate; a perianth of bristles often present.

Flowers all unisexual.

Fertile flower in each spikelet one, naked, terminal . . . . . *Hypolytrum*

Fertile flowers in each spikelet often more than one, each subtended by a scale, lateral.

Fertile flower basal . . . . . *Scleria*

Fertile flower terminal . . . . . *Calyptracarya*

Flowers at least partly (the fertile ones) perfect.

Empty scales at the base of the spikelet 3 or more.

Style 3-cleft . . . . . *Cladium*

Style 2-cleft.

Spikelets somewhat compressed, clustered in a single head; bristles none . . . . . *Dichromena*

Spikelets not compressed, usually paniculate or corymbose; bristles usually present . . . . . *Rhynchospora*

Empty scales at the base of the style usually only 1-2.

Base of the style persistent upon the achene as a tubercle . . *Bulbostylis*

Base of the style not persistent.

Flowers without inner perianth scales.

Base of the style swollen; bristles none . . . . . *Fimbristylis*

Base of the style not swollen; bristles present . . . . . *Scirpus*

Flowers with one or more inner perianth scales.

Flowers with 3 broad stipitate scales alternating with bristles or perianth of 6 bristles; plants perennial, with broad leaves.

*Fuirena*

Flowers with 1-2 hyaline scales and no bristles; annuals with narrow leaves.

Inner scales 2, convolute . . . . . *Lipocarpa*

Inner scale 1, minute . . . . . *Hemicarpha*

## ABILDGAARDIA Vahl

Glabrous perennials with slender culms, the narrow, setaceous basal leaves flattened; spikelets usually solitary, subtended by an involucre of one bract; scales imbricated in two rows, keeled and deciduous; bristles none; stamens 1-3; style pubescent, deciduous, with a somewhat swollen base; achenes trigonous.

About 15 species, chiefly in the Old World tropics. Only the following species is known from Central America.

**Abildgaardia monostachya** (L.) Vahl, Enum. 2: 296. 1805.  
*Cyperus monostachyos* L. Mant. 180. 1771. *Fimbristylis monostachya* Hassk. Pl. Jav. Rar. 61. 1848. *Covokillo*.

Savannas or dry slopes, 1600 meters or less; Petén; Huehuetenango. Florida; Yucatan and Tabasco to Panama; South America; Old World tropics.

A caespitose perennial, the base of the plant usually hard and bulb-like, the culms wiry, often twisted, 10-40 cm. tall, glabrous; leaves setaceous, 10-30 cm. long, 0.5-1.5 mm. wide, about half as high as the culms, flat or involute, scaberrulous on the margins; involucre bracts 1 or 2, shorter than the spikelet; spikelet ovate-lanceolate, 20-40-flowered, 10-20 mm. long, 5 mm. wide; scales ovate, acute, cuspidate, chartaceous, closely imbricate, 5-7 mm. long, strongly keeled; style with 3 short branches; achene depressed-globose, umbonate, broadly stipitate, 1.5-2.5 mm. long, yellowish-white or brown, conspicuously verrucose or muricate.

## BULBOSTYLIS

*Reference:* Henry K. Svenson, Scirpeae, N. Amer. Fl. 18: 540-550. *figs.* 8-21. 1957.

Annuals or perennials, the culms slender, sometimes filiform, leafy below, the leaves narrowly linear or filiform, the sheaths ciliate or pubescent; spikelets umbellate, capitate, or solitary, subtended by one to several bracts, the scales spirally imbricate, commonly deciduous, mostly pubescent; flowers perfect; perianth none; stamens 2-3; style 2-3-cleft, glabrous, its base enlarged and persistent as a tubercle at the apex of the achene; achene 3-angulate, turgid or lenticular.

About 70 species, in temperate and warm regions of both hemispheres. All but one of the known Central American species are listed here.

Spikelets solitary at the apex of the culm, sometimes also borne at the bases of the culms.

Spikelets acuminate.....*B. Funckii*

Spikelets ovoid, obtuse.

Plant with a thickened woody base.....*B. paradoxa*

Plant not woody-thickened at the base.....*B. pubescens*



Spikelets capitate or umbellate at the apex of the culm, always more than one.

Spikelets all sessile or nearly so, in head-like clusters, these solitary or umbellate.

Plants slender annuals; achenes 0.6 mm. long. . . . . *B. barbata*

Plants perennials; achenes 0.7–0.9 mm. long.

Plants glabrous. . . . . *B. junciiformis*

Plants copiously pubescent, at least on the culms and leaves. . . . *B. vestita*

Spikelets all or mostly pedicellate, often solitary on the rays of the umbel.

Achenes (when mature) prominently spinescent-papillose, 0.6–0.8 mm. long; pedicels delicate, mostly arcuate-upcurved; spikelets narrowly lanceolate. . . . . *B. tenuifolia*

Achenes (when mature) not prominently spinescent-papillose, commonly transversely rugose or with wavy lines, 0.75–1.2 mm. long; pedicels thicker and firmer, mostly straight; spikelets lance-ovate to ovoid-oblong.

Mature achenes stramineous; slender annuals; achenes 0.75–0.9 mm. long. . . . . *B. capillaris*

Mature achenes dark gray; annuals or perennials; achenes 0.8–1.2 mm. long.

Slender annuals. . . . . *B. arenaria*

Perennials with hard thickened base. . . . . *B. juncoides*

***Bulbostylis arenaria* (Nees) Lindm. Bih. Sv. Vet.-Akad. Handl.**

26 (3) 9: 19. 1900. *Isolepis arenaria* Nees, Linnaea 9: 291. 1834, *nomen nudum*. *Oncostylis arenaria* Nees in Mart. Fl. Bras. 2, pt. 1: 87. 1842.

At 100 meters or less. Sandy pinelands, British Honduras (*Schipp* 919); West Indies; northeastern South America to eastern Brazil.

Plants annual, tufted, the culms slender, 5–25 cm. high, glabrous or rarely minutely strigulose; leaves half as long as the culms or shorter; spikelets 2–6 mm. long, acute; scales brown, keeled, acute to cuspidate; achenes obovate, 0.8–1.1 mm. long, transversely rugose, becoming dark gray when mature.

The specimen from British Honduras, determined by Dr. Svenson, has not been examined by the authors.

***Bulbostylis barbata* (Rottb.) Clarke in Hook. f. Fl. Brit. Ind.**

6: 651. 1893. *Scirpus barbatus* Rottb. Descr. Pl. Rar. 27. 1772. *S. barbatus* Rottb. Descr. 52. pl. 17, f. 4. 1773.

At 200 meters; Sololá (near the railroad station at Guatalón, *Steyermark* 48075). Southeastern United States; Martinique; South America; widely distributed in the Old World tropics.

Plants annual, densely tufted, the culms very slender, 5–20 cm. high, glabrous or nearly so; leaves half as long as the culms, setaceous, almost glabrous, the sheaths bearing numerous long white hairs at the apex; spikelets 3–12, sessile in a dense head or compact umbel 1–1.5 cm. in diameter, ferruginous to dark brown, 3–10 mm.

long, linear to oblong-lanceolate, acute, 3-15-flowered; scales rather distant on the rachilla, cymbiform, ovate-lanceolate, strongly keeled with a green midrib and brown sides and a small subrecurved mucro, mostly sparsely strigose-hispidulous or rarely glabrous; style equaling the achene, the persistent base minute, red or blackish; achene trigonous, obovate or obovoid, 0.6 mm. long, pale or dull brown, subtruncate, smooth or obscurely reticulate.

It would be interesting to know in what manner this plant, mostly of Asia and Africa, has reached the lowlands of Guatemala.

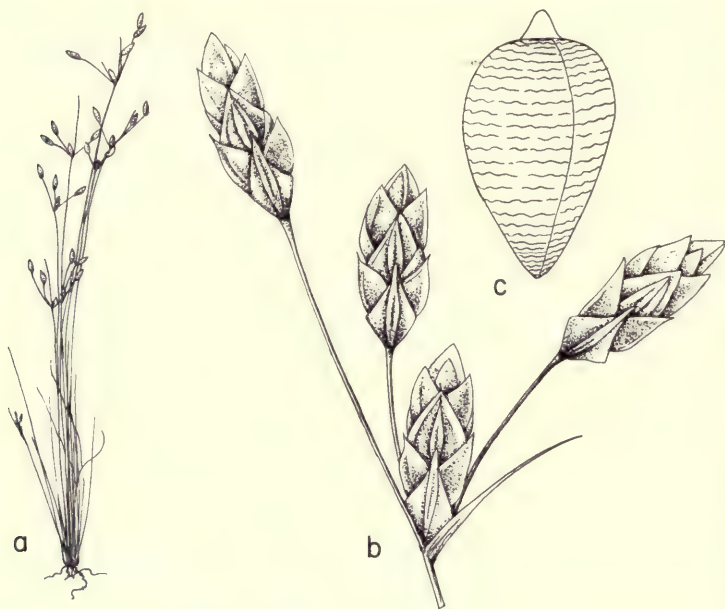


FIG. 22. *Bulbostylis capillaris*. a, Habit ( $\times \frac{1}{3}$ ). b, Inflorescence ( $\times 4\frac{1}{2}$ ). c, Achene ( $\times 42$ ).

***Bulbostylis capillaris* (L.) Clarke** in Hook. f. Fl. Brit. Ind. 6: 652. 1893. *Scirpus capillaris* L. Sp. Pl. 49. 1753. *Fimbristylis capillaris* Gray, Man. 530. 1848. *Stenophyllus capillaris* Britton, Bull. Torrey Club 21: 30. 1894. Figure 22.

Sandy stream beds and rocky slopes, often in pine-oak forest, 250-1900 meters; Zacapa; Quezaltenango; Huehuetenango. United States to Mexico; British Honduras; Honduras; Panama; Cuba.

Plants annual, densely cespitose, the culms very slender, 5-30 cm. tall, 4-6-striate, glabrous or minutely scaberulous at the apex; leaves 3-15 cm. long, about 1 mm. wide, filiform, shorter than the culms, bearing a tuft of very long hairs at the apex of the sheath, scabrous on the margins, otherwise usually glabrous or

nearly so; bracts 1-3, setaceous, short; spikelets ovoid-oblong, 5-8 mm. long, about 1.5 mm. wide, mostly 6-14-flowered, long-pedicellate, in simple or compound umbels; scales ovate, rounded to emarginate at the apex, dark brown, the keel green, minutely puberulent or fimbriate; achene trigonous, obovate or obovoid, 0.75-0.9 mm. long, stramineous to pale brown, truncate at the apex with a small conic tubercle.

**Bulbostylis Funckii** (Steud.) Clarke in Urban, Symb. Antill. 5: 290. 1907. *B. Funckii* (Steud.) Clarke, Kew Bull. Add. Ser. 8: 26. 1908. *Isolepis Funckii* Steud. Syn. Pl. Glum. 2: 91. 1855. *Stenophyllus Funckii* Britton, Bull. Torrey Club 21: 30. 1894.

Damp meadows, about 1800 meters, or lower; Huehuetenango (along road east of San Sebastian, *Standley 81476*); reported also from San Marcos (Malacatán). Southwestern United States; Mexico; El Salvador; South America.

A dwarf annual, the filiform culms and leaves 3-12 cm. high, the culms striate, glabrous or nearly so, the very narrow leaves scaberulous on the margins; spikelets linear to lance-oblong, acuminate, solitary at the apex of the culm and densely clustered and sessile at the base of the plant in the leaf axils, 4-10 mm. long; basal spikelets few-flowered and sometimes reduced to a single flower; scales of the terminal spikelet lanceolate, acute to mucronate, dark brown or castaneous with green keel, loosely attached, the lowest one often elongated and bract-like; achene trigonous, broadly obovate, 1-1.5 mm. long, white or stramineous to gray, obscurely to deeply transverse-rugulose, tubercle narrowly to broadly conic.

A curious plant because of its unusual mode of inflorescence, not matched in any other Central American member of this family (except very rarely in one species of *Eleocharis*).

**Bulbostylis junciformis** (HBK.) Lindman, K. Sv. Vet.-Akad. Handl. 26 (3) 9: 19. 1900. *Isolepis junciformis* HBK. Nov. Gen. & Sp. 1: 222. 1815. *Stenophyllus junciformis* Britton, Bull. Torrey Club 43: 442. 1916.

Rocky hillsides or in open grassy places, sometimes in pine forest, 200-1800 meters; Zacapa; Jutiapa; Huehuetenango. British Honduras; El Salvador; Honduras; Costa Rica; Panama; Cuba; southward in South America to Brazil.

A glabrous perennial with bulbous-thickened culm bases and fibrous roots, the culms caespitose, filiform, rigid, striate, 15-45 cm. tall; leaves 6-30 cm. long, shorter than the culms, frequently glaucous, sometimes scaberulous on the margins, the sheaths dull castaneous to dark brown, the apices long-fibrillose; bracts often shorter than the inflorescence, this consisting of a compound umbel, open or usually condensed, narrowly umbellate, the capitate glomerules on rays 1-3 cm. long or reduced to a single capitate inflorescence; spikelets fasciculate in clusters of 3-5, lanceolate, acute, commonly 4-8 mm. long, 3-5-flowered; scales lanceolate, acute



to short mucronate with the excurrent keel, the sides castaneous to reddish brown, minutely pubescent; achene bluntly trigonous, obovate or obovoid-cuneate, 0.7–0.9 mm. long, white or pale stramineous, when mature becoming bluish-gray, papillate, tipped with a small black tubercle.

**Bulbostylis juncoides** (Vahl) Kükenth. in Osten, Anal. Mus. Hist. Nat. Montevideo II. 3: 187. 1931. *Schoenus juncoides* Vahl, Enum. 2: 211. 1805. *Bulbostylis hirtella* sensu Clarke, in Urban, Symb. Ant. 2: 166. 1900, not *Isolepis hirtella* Schrad. in Schult. Mant. 2: 70. 1824. *Bulbostylis Langsdorffiana* Clarke, in Urban, Symb. Ant. 2: 89. 1900, as to Mexican specimens determined by Clarke in Kew herb. *Fimbristylis capillaris* var. *pilosa* Britton, Bull. Torrey Club 15: 102. 1888 (type from Santa Rosa, Baja Verapaz, *Tuerckheim 1283* [1293 as cited by Svenson in N. Amer. Fl. 18: 550. 1957]). *Zacatillo* (Petén).

Oak forest, dry open slopes, cornfields, and sandbars, mostly at 1500–2500 meters; reported from Petén; Baja Verapaz; Chimaltenango; Quezaltenango; Huehuetenango. Southwestern United States; Mexico to Honduras; West Indies; South America.

Plants perennial with hard, thickened, somewhat bulbous base and coarse roots, densely cespitose, the culms filiform, sulcate, mostly 10–15 cm. high, sometimes as much as 30 cm., glabrous to pilose; leaves setaceous, erect, often glaucous, usually one-third the length of the culms, glabrous to short-pilose; sheaths dark brown to cinnamon, fimbriate at the apex; inflorescence in the typical plant congested and not radiate, but more often open and umbellate with rays 0.5–2 cm. long bearing single spikelets; spikelets lance-ovate, subacute, 3–8 mm. long, castaneous; scales broadly ovate, obtuse to acute, green-carinate, the keel short-excurrent in the lowest glumes, frequently glutinous, glabrous to hirtellous; achene trigonous, obovoid or broadly obovate, 0.8–1.2 mm. long, yellowish brown or when mature dark gray, when mature rugulose with transverse wavy lines, tipped with a rounded-conic, dark brown, sessile tubercle.

Most of the Guatemalan material may be referred to var. *ampleiceps* Kükenth., in which the inflorescence is radiate with the rays of the umbels bearing single spikelets.

**Bulbostylis paradoxa** (Spreng.) Lindm. Bih. Sv. Vet.-Akad. Handl. 26 (3) 9: 17. 1900. *Schoenus paradoxus* Spreng. Syst. Veg. 1: 190. 1825. *Schoenus spadiceus* HBK. Nov. Gen. & Sp. 1: 227. pl. 69, f. 1. 1815, not *Schoenus spadiceus* Vahl, 1805. *B. paradoxa* Clarke, Kew Bull. Add. Ser. 8: 109. 1908. *Stenophyllus paradoxus* Standl. Contr. U. S. Nat. Herb. 18: 88. 1916. *B. spadicea* (HBK.) Kükenth. Repert. Sp. Nov. 23: 197. 1926.

British Honduras (El Cayo District, sandy pine uplands), and probably extending into Petén. Oaxaca; Cuba; Costa Rica; Panama; southward in South America to Brazil.

A glabrous perennial, usually forming very large and dense, hard clumps, arising from a thick caudex often 4–5 cm. in diameter; culms 4–12, very slender, striate, 5–20 cm. tall, smooth; leaves numerous, filiform and wiry, equaling or shorter than the culms, less than 0.5 mm. wide, ciliate, the short densely lanate sheaths with long hairs at the apex; bracts absent; spikelets solitary, obovate, 6–10 mm. long, 3–5 mm. wide; scales lance-subulate, rigid, 3-nerved, lanate-fimbriate on the keel, this excurrent as a mucro 2 mm. long; achene trigonous, obovate to pyriform, 1.5 mm. long, pale to dark brown, transversely rugose.

This is typically a savanna plant which evidently is exceptionally resistant to fires to which such areas generally are subjected in Central and South America. At the base of the hard mass of green leaves and culms there usually is a dense coat consisting of the bases of the leaves of former years, badly scorched and charred.

***Bulbostylis pubescens*** (Presl) Svenson, N. Amer. Fl. 18: 542. 1957. *Abildgaardia pubescens* Presl, Rel. Haenk. 1: 180. 1828. *Fimbristylis Preslii* Kunth, Enum. Pl. 2: 228. 1837.

At 200 meters; Zacapa (dry plains, near Estanzuela, *Steyermark 29089*). Mexico; El Salvador; Costa Rica to Colombia.

Plants annual or perhaps perennial, the culms densely cespitose, wiry and slender, striate, 10–30 cm. high, about 0.6 mm. thick at the apex, glabrous to slightly hispid, minutely somewhat roughened; leaves setaceous, much shorter than the culms, usually less than half as long as the culms, glabrous to pilose with short spreading hairs, the sheaths stramineous, long-pilose at the apex; spikelets solitary at the apex of the culm, brown, ovoid to lance-oblong, 5–13 mm. long, 3–6 mm. wide; scales broadly ovate, acute to obtuse, sometimes mucronate, stramineous to black, little or not at all keeled with greenish midrib, nearly glabrous to hirtellous; achene trigonous, obpyramidal to broadly obovate, truncate to depressed at the apex and deeply 3-lobed, abruptly narrowed below the middle to a stipitate base, 1.2–1.3 mm. long, pale brown or yellowish, prominently transversely rugose when mature, tipped with a conic trigonous tubercle.

***Bulbostylis tenuifolia*** (Rudge) Macbr. Field Mus. Bot. 11: 5. 1931. *Scirpus tenuifolius* Rudge, Pl. Guian. 18. 1805. *Bulbostylis capillaris* var. *tenuifolia* Clarke, Symb. Ant. 2: 89. 1900.

At 2000 meters or lower; Guatemala; Jalapa; Huehuetenango. Mexico; El Salvador; Honduras; Costa Rica; Panama; Cuba; northern South America.

Plants chiefly annual, densely cespitose, the culms slender, 5–30 cm. tall, striate, glabrous or rarely hirtellous; leaves 3–15 cm. long, filiform, shorter than the culms, mostly glabrous; inflorescence usually broader than high in a simple or

compound umbel; spikelets narrowly lanceolate, acute, 3–6 mm. long, solitary and mostly long-pedicellate at the ends of usually upwardly curved arcuate delicate pedicels; scales dark brown, obtuse to acute, glabrous to hirtellous; achene trigonous, obovate, 0.6–0.8 mm. long, stramineous to gray-brown, when mature finely spinescent-papillose, when immature almost smooth to somewhat reticulate, tipped by a minute reddish-brown tubercle.

**Bulbostylis vestita** (Kunth) Clarke, Symb. Ant. 2: 87. 1900. *Isolepis vestita* Kunth, Enum. Pl. 2: 210. 1837. *Stenophyllus vestitus* Britton, Bull. Torrey Club 43: 446. 1916.

Probably in savannas, Petén (La Libertad). Southern Mexico and British Honduras; Honduras; West Indies; South America.

Plants perennial, usually densely caespitose, sometimes with enlarged culm bases, the very slender culms rigid, 10–40 cm. tall, strigose-pubescent; leaves setaceous, 25 cm. long or less, usually shorter than the culms, densely strigose-pubescent, the sheaths stramineous to light brown, long-fimbriate at the apex; bracts very short; spikelets forming a single terminal head or a simple umbel of few heads, 3–10 mm. long; scales ovate, coriaceous, reddish brown, frequently glutinous, hirtellous, the yellowish keel prominently mucronate, the mucro about 1 mm. long; achene trigonous, obovate or obovoid-cuneiform, 0.8–0.9 mm. long, white to brown with a prominent yellow stripe beneath the blunt angles, when mature cellular-reticulate or minutely papillate, tipped with a minute, pale brown, flattened tubercle.

### CALYPTROCARYA Nees

Cespitose perennials with more or less leafy culms and long narrow leaves; spikelets crowded in small dense heads, laxly corymbose-paniculate, the panicles terminal and axillary; spikelets unisexual, very small, fasciculate and sessile, each pedicel bearing a capitate cluster of false spikelets, each of these consisting of a terminal globose 1-flowered pistillate spikelet and several smaller ovoid 1–4-flowered staminate spikelets; stamen 1; bristles none; style slender, the branches 2–3, filiform; achene subglobose, not beaked.

About 7 species in tropical America. Only one species is known from Central America.

**Calyptracarya glomerulata** (Brongn.) Urban, Symb. Antill. 2: 169. 1900. *Becquerelia glomerulata* Brongn. in Duperrey, Voy. Coquille 2: 163. 1829. *C. fragifera* Kunth, Enum. Pl. 2: 364. 1837. Figure 23.

Densely forested swamps, at 350 meters or less; Alta Verapaz (Cubilgüitz); Izabal. Chiapas to British Honduras and Panama, and in many regions of South America.

Plants glabrous or nearly so, commonly 30–50 cm. high, with short rhizomes or none, the culms trigonous, almost covered by the sheaths, these purple and usually overlapping, sometimes puberulent; leaves 20–50 cm. long, 3–7 mm. wide,





FIG. 23. *Calyptrocarya glomerulata*. a, Habit ( $\times \frac{1}{2}$ ). b, Pistillate spikelet ( $\times 25$ ). c, Cluster of spikelets ( $\times 12$ ). d, Achene ( $\times 21$ ).

antrorsely scaberulous on the margins, 3-nerved; bracts large and similar to the leaves; inflorescence about three-fourths the length of the whole plant, with 4-6 umbelliform panicles, the peduncles 1-2 cm. long, each bearing 6-10 pedicels; false spikelets 3-6, the pistillate spikelets 1.5 mm. long, the staminate spikelets 1-4-flowered; style branches 2; achene 1 mm. long and broad, lenticular, at first white and lustrous, becoming dull brown, puberulent, umbonate at the apex.

Common about Puerto Barrios, where it seems to be confined to *Manicaria* swamps.

## CAREX L.

*Reference:* Kennenth K. Mackenzie, *Cariceae*, N. Amer. Fl. 18: 3-478. 1931-35; North American *Cariceae*, *pls.* 1-539. 1940.

Plants grass-like, perennial by rhizomes, the culms mostly trigonous; leaves 3-ranked, the upper ones (bracts) elongate or short and subtending the flower spikes, or wanting; flowers usually monoecious, sometimes dioecious, the flowers solitary in the axils of the glumes or scales, forming short and head-like or often much elongate spikes; spikes one to many, wholly pistillate, wholly staminate, androgynous (with staminate flowers above and pistillate ones below), or gynaeandrous (with pistillate flowers above and staminate ones below); perianth none; stamens 3; pistillate flower of a single pistil, with a style and 2-3 stigmas; achene trigonous or lenticular, completely enveloped in a tight or inflated perigynium.

One of the largest genera of plants, with more than 1000 species, found in most parts of the earth but most abundant in temperate or cold regions. Very few species are found in the tropics, and those chiefly in the mountains at higher elevations. About three other species have been found in Costa Rica and Panama.

Spikes sessile, short and head-like; achenes lenticular, the stigmas 2; perigynia glabrous.

Terminal or all the spikes androgynous.

Rootstocks long-creeping; perigynia 1.5 mm. wide, spongy at base.

*C. praegracilis*

Rootstocks short-creeping; perigynia 2-3 mm. wide, not spongy at base.

*C. xalapensis*

Terminal or all the spikes gynaeandrous.

Body of the perigynium widest above the middle; heads pale green . . . *C. Longii*

Body of the perigynium widest at or below the middle; heads mostly brownish or castaneous . . . . . *C. peucophila*

Spikes usually conspicuously pedunculate, if sessile the spikes much longer than broad; achenes lenticular and with 2 stigmas, or triangular in cross section and with 3 stigmas; perigynia glabrous or sometimes pubescent.

Perigynia scabrous or pubescent.

Body of the perigynium completely filled by the achene . . . . . *C. planostachys*

Body of the perigynium not completely filled by the achene, the upper part empty.

Leaves 1-2.5 mm. wide; scales short-aristate at the apex . . . . . *C. scabrella*

Leaves 2.5-4 mm. wide; scales long-aristate . . . *C. polystachya* var. *Bartlettii*

**Perigynia glabrous.**

Stigmas 2; perigynia abruptly contracted into a minute beak.

*C. cuchumatensis*

Stigmas 3; perigynia with a conspicuous, often elongate beak, often attenuate to the beak.

Spikes paniculate, the lowest peduncles of the inflorescence branched.

*C. polystachya*

Spikes not paniculate, the peduncles all simple, the spikes sometimes sessile or nearly so.

Achenes continuous with the style, the style persistent; perigynia somewhat inflated; spikes about 8 mm. thick . . . . . *C. Thurberi*

Achenes jointed with the style, the style withering in age; perigynia not at all inflated; spikes usually conspicuously less than 8 mm. thick.

Scales of the spikes blackish, castaneous, or ferruginous, the spikes very dark-colored or ferruginous.

Pistillate spikes mostly 4 cm. long or shorter; achenes not outcurved.

Scales dark brown-purple to blackish; spikes all androgynous; perigynia 3-3.5 mm. long, the beak subentire, 0.3-0.6 mm. long.

*C. tojquianensis*

Scales ferruginous; terminal and upper spikes androgynous, the others pistillate; perigynia 5-5.5 mm. long, the elongated beak 2.5 mm. long, conspicuously bidentate at apex.

*C. tunimanensis*

Pistillate spikes mostly 6-12 cm. long; achenes in age spreading or conspicuously outcurved . . . . . *C. Donnell-Smithii*

Scales of the spikes pale, usually green or greenish, the spikes not dark-colored.

Leaves 6 mm. wide or narrower.

Leaf sheaths and bracts more or less minutely pubescent.

*C. anisostachys*

Leaf sheaths and bracts glabrous.

Culms pale green at base; spikes erect, crowded . . . *C. quichensis*

Culms purplish at base; spikes, at least the lower, drooping, remote . . . . . *C. venosivaginata*

Leaves all or chiefly 8-24 mm. wide.

Leaves about 5-15 mm. wide; scales abruptly long-aristate.

*C. huehueteca*

Leaves 15-24 mm. wide; scales short-aristate . . . . *C. Steyermarkii*

**Carex anisostachys** Liebm. Dansk. Vid. Selsk. Skrivr. V. 2: 266. 1850.

Mountain forest, often with *Juniperus*, often on open grassy slopes or in alpine meadows, frequently on limestone, 3300-3700 meters; Huehuetenango (Sierra de los Cuchumatanes; collected at several localities). Central and southern Mexico.

Plants usually densely cespitose, from densely matted, woody rootstocks, the culms mostly 50 cm. high or often much lower, slender but stiff, much longer than the leaves; basal leaf sheaths becoming shredded in age; leaves mostly 5-15 cm.



long, 1–3 mm. wide, flat with revolute margins, glabrous or sparsely pubescent, the sheaths somewhat pubescent, reddish-spotted ventrally; spikes 3–5, erect, close together or the lowest somewhat remote, the lowest spike conspicuously pedunculate, the upper ones short-pedunculate or subsessile, the upper spike androgynous or staminate throughout or pistillate in the center, the other spikes pistillate, linear, 7–15 mm. long, 3 mm. broad, the perigynia 10–20; lowest bract 2–4 cm long, shorter than the inflorescence, the other bracts much shorter or absent, sheathless or nearly so; staminate scales hyaline with a green midrib, tinged with brownish or straw-color; pistillate scales ovate, narrower than the perigynia, longer than the perigynia and acuminate, to shorter than the perigynia and subobtus, greenish-hyaline and somewhat tinged with reddish brown; perigynia rather narrowly oval-obovoid, 2.5–3 mm. long, triangular in cross section, not at all inflated, glabrous, with few slender nerves, green, abruptly contracted into a short beak; achene 1.5 mm. long, oblong-oval, acutely triangular in cross section, brownish, with concave sides, geniculate with the very short style; stigmas 3.

**Carex cuchumatensis** Standl. & Steyerl. *Ceiba* 4: 62. 1953.

In swampy ground along streams or in running water, Sierra de los Cuchumatanes, 2100–3500 meters; endemic; Huehuetenango (type collected in vicinity of Tunimá, Sierra de los Cuchumatanes, 3400–3500 meters, July 7, 1942, *Steyermark* 48347; in Herbarium of Chicago Natural History Museum).

Loosely caespitose, stoloniferous and forming colonies, the stolons stout, scaly, and ascending, the culms 1.5–4.2 dm. high, 3–4 mm. thick at base, erect, strict, triangular with concave sides, smoothish or only slightly roughened above, pale brown at base, the lower and basal sheaths not at all filamentose; sterile shoots elongate, conspicuous; leaves with well-developed blades 4–5 to a fertile culm, on the lower third, the blades gray-green or light green, 3–4 dm. long, 3–4.5 mm. wide, long-tapering, closely serrulate on margins; staminate spike solitary, mostly pistillate, short-peduncled, linear-spatulate, 3.2–3.5 cm. long, 3–5 mm. wide, the scales oblong-obovate, obtuse, purplish-black with light-colored center not extending to tip and very narrow white-hyaline apex and margins; pistillate spikes 3–6, approximate, sessile or the lower as much as 1 cm. long-pedunculate, linear, 1.8–3.2 cm. long, 3–5.5 mm. wide, densely flowered throughout, 100–150-flowered, appressed; bracts with prolonged sheaths, leafy, equaling or mostly surpassing the inflorescence, greenish, pale or drab brown at base; pistillate scales ovate-oblong, the middle and upper ones obtuse, the lower mucronate to aristate, narrower and shorter than the perigynia, purplish-black with pale 1–3-nerved center 0.4–0.6 mm. wide not extending to tip and very narrow hyaline apex; perigynia yellowish-green or stramineous, broadly elliptic-ovate, plano-convex, 2.7–2.9 mm. long, 2–2.2 mm. wide, minutely serrulate at apex, membranous, papillate, round-tapering at base, short-stipitate, glabrous, 6–10-nerved on both faces, abruptly apiculate, the beak only 0.1–0.2 mm. long, the orifice subentire or only slightly bidentate; achenes lenticular, obovate, body of achene 1.8–1.9 mm. long, 1.5 mm. wide, the slender style 0.5 mm. long; stigmas 2, slender.

**Carex Donnell-Smithii** L. H. Bailey, Mem. Torrey Club 1: 56. 1889.

Usually in damp or wet, mixed, mountain forest, 1300–3800 meters; Alta Verapaz (type from Pansamalá, *Tuerckheim* 659); Baja Verapaz; El Progreso; Zacapa; Jalapa; Jutiapa; Chimaltenango; Sololá; Quiché; Quezaltenango; San Marcos. Honduras; El Salvador; Costa Rica; Panama.

Plants tall and coarse, often a meter high and forming large culms; culms purplish at the base; leaves numerous, elongate, 3–10 mm. wide, glabrous, stiff, long-attenuate; inflorescence compound, 20–60 cm. long, the lower branches in 2's or 4's, the upper simple; spikes numerous, androgynous, narrowly linear-cylindric, 3–12 cm. long, 3.5–5 mm. thick, the pistillate portion loosely 20–50-flowered; scales lance-ovate, usually rough-awned, purplish black; perigynia lanceolate, 3.5–4 mm. long, membranaceous, dull green, scarcely inflated, glabrous, punctulate, 2-costate and strongly few-nerved, short-stipitate, abruptly rostrate, the beak excurved, 1–1.5 mm. long, bidentate.

A forest plant, abundant in many localities, especially in the Occidente. It sometimes forms large colonies along the white-sand quebradas in the region between San Martín, Chile Verde and Colimba. Guatemalan material has been referred to *C. Jamesonii* Boott, a South American species.

**Carex huehueteca** Standl. & Steyerm. Field Mus. Bot. 23: 195. 1947.

Known only from the type, Huehuetenango, Sierra de los Cuchumatanes, Cerro Cananá, near Cananá, 2500–2800 meters, growing along a stream, *Steyermark* 49055.

Plants densely caespitose, with short stout stolons, the culms slender, erect, 60 cm. high or more, obtusely trigonous, dark purplish brown below the nodes, smooth; leaf sheaths broad and lax, dark reddish brown or purple-brown; leaves numerous, rather thin and soft, pale green when dried, the blades 12–27 cm. long, about 5–15 mm. wide, narrowly attenuate, conspicuously costate, inconspicuously septate between the nerves, flat, the margins smooth; spikes few or several, on very long, slender peduncles, apparently pendulous, the terminal one staminate, the others pistillate or perhaps some of them androgynous, linear, mostly 3–4.5 cm. long, laxly and rather distantly flowered, the bracts filiform, erect, short, long-vaginate at the base, the sheaths as much as 1 cm. long, purple-brown; scales pale brownish or brownish green or yellowish green, oblong-oval, about 2.5 mm. long, abruptly contracted at the apex and bearing a stiff erect awn as much as 5 mm. long but usually shorter; perigynia fusiform-lanceolate, greenish, compressed-triangular in cross section, conspicuously nerved, glabrous, 3.5 mm. long, 1 mm. broad, gradually attenuate into the beak; stigmas 3.

The type specimen is in poor condition for study, being in advanced fruit, but the plant is clearly different from any other species

known from Central America or Mexico. It is noteworthy for its wide leaves, the foliage in general being reminiscent of *Luzula gigantea*.

**Carex Longii** Mackenzie, Bull. Torrey Club 49: 372. 1922.

Marshes and wet meadows, 1500–2300 meters; Alta Verapaz; Jalapa. United States and Mexico; Costa Rica; Venezuela.

Plants densely caespitose, the culms 30–75 cm. tall, slender but stiff; leaves 2–3.5 mm. wide, with green sheaths; spikes 3–10, gynaeandrous, silvery-greenish or silvery-brownish, aggregated into a head 2–4 cm. long, the spikes ovoid, 6–10 mm. long and 4–6 mm. wide, obtuse; perigynia numerous, appressed-ascending; scales ovate, subobtuse, shorter than the perigynia; perigynia strongly compressed, plano-convex, 3–4 mm. long, 2 mm. wide, glabrous, the body broadly obovate, conspicuously winged and serrulate, abruptly short-rostrate, the beak one-third as long as the body, bidentate; achenes substipitate.

This has been reported for Guatemala under the name *Carex albolutescens* Schwein.

**Carex peucophila** Holm, Contr. U. S. Nat. Herb. 8: 290. *pl.* 63, *f. a–e*. 1905.

Moist or wet, alpine meadows or rocky slopes or cliffs, often or usually on limestone, 3300–3750 meters; Huehuetenango (Sierra de los Cuchumatanes; collected at several localities). Southern Mexico.

Plants loosely caespitose, the rootstocks long-creeping, brownish, rather slender; culms slender, 40 cm. high or lower, erect or nearly so, obtusely tetragonous, much exceeding the leaves; leaf blades erect or ascending, 3–20 cm. long, 1.5–2.5 mm. wide, dull green, firm, with revolute margins; spikes 3–6, gynaeandrous, close together or the lowest ones separated, ovoid or subglobose, 6–9 mm. long, 4.5–6 mm. broad, rounded at the apex, densely flowered, the staminate flowers very few and inconspicuous; perigynia appressed-ascending, the beaks not prominent; scales ovate, obtuse, somewhat narrower and shorter than the perigynia, chestnut-brown, with a green center; perigynia plano-convex, ovate, 4.5 mm. long, 1.8–2 mm. wide, narrowly wing-margined, serrulate to the middle, dull green or finally brownish, subcoriaceous, rounded or truncate at the base, tapering or rather abruptly contracted into a flat beak 1 mm. long; achenes lenticular, suborbicular-quadrate, nearly 2 mm. long, 1.5 mm. wide, yellowish, truncate at the apex, geniculate with the slender style; stigmas 2.

**Carex planostachys** Kunze, Suppl. Riedgr. 138. *pl.* 35. 1840.

Known only in Guatemala from the department of Huehuetenango, where collected in dry soil near Chaculá at 1600 meters, by Seler. Mexico to northeastern Texas.

Plants low, from short stout rhizomes, the culms 20 cm. high or less, rough, brownish at the base; leaves clustered above the base, 1–2.5 mm. wide, long-atten-



uate, rough above; terminal spikes staminate, linear, 8–12 mm. long, short-pedunculate, the lateral spikes pistillate, the upper 2 contiguous, sessile, the lower ones slender-pedunculate, basal, oblong, 5–10 mm. long, 3–4 mm. wide, 6–12-flowered; scales lance-ovate, acutely carinate, acute to cuspidate; perigynia obovoid-elliptic, 3.5 mm. long, not inflated, many-nerved, light green, substipitate, abruptly rostrate, the beak 0.5 mm. long, obliquely cut.

This was reported from Guatemala by Loesener under the name *C. Halleriana* Asso.

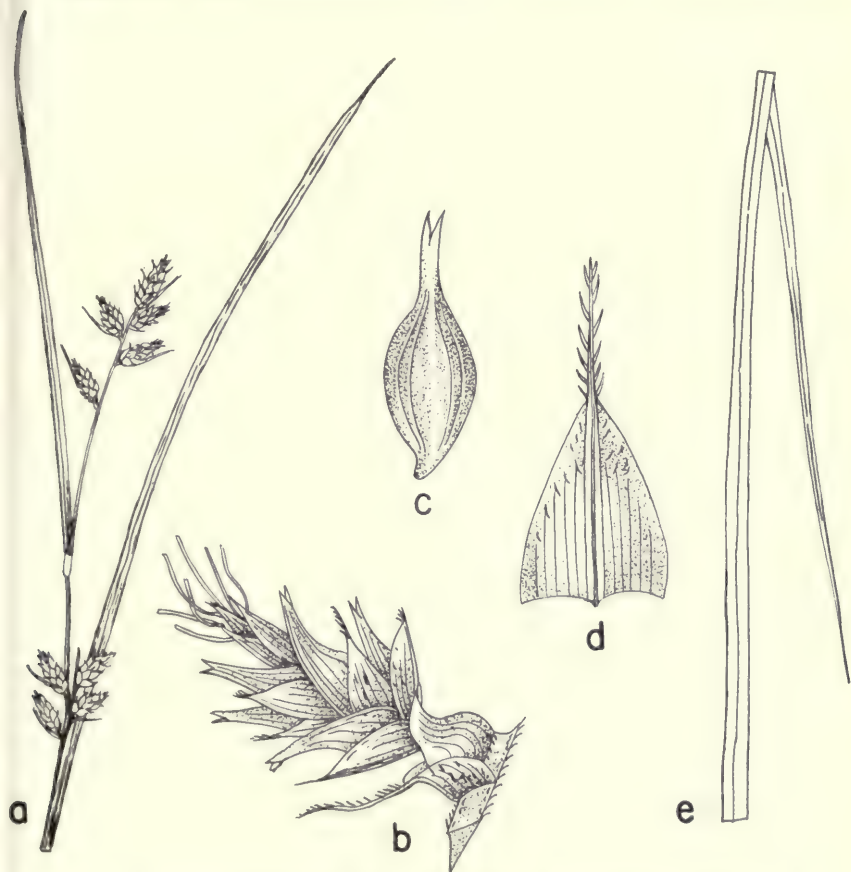


FIG. 24. *Carex polystachya*. a, Upper portion of flowering branch ( $\times \frac{2}{3}$ ). b, Spikelet ( $\times 5$ ). c, Perigynium ( $\times 10$ ). d, Scale ( $\times 10$ ). e, Part of leaf ( $\times 1\frac{1}{2}$ ).

*Carex polystachya* Swartz ex Wahl. Kongl. Akad. Handl. 24: 149. 1803. *C. cladostachya* Wahl. loc. cit. *C. Hartwegii* Boott ex Benth. Pl. Hartw. 96. 1848 (type collected near Guatemala, *Hartweg* 628). *C. polystachya* var. *minor* Boott, Ill. Carex 490, 492. 1867. Figure 24.

Damp or wet, mixed forest or oak or pine forest, sometimes in thickets or open meadows, abundant in many localities, 300–3500 meters, most plentiful at middle or rather high elevations; Alta Verapaz; Zacapa; Chiquimula; Jalapa; Santa Rosa; Guatemala; Sacatepéquez; Chimaltenango; Sololá; Quiché; Huehuetenango; Quezaltenango. Mexico to Panama, southward to Bolivia; West Indies.

Plants erect or ascending, often forming dense clumps, with short, somewhat woody rhizomes, the slender culms 20–50 cm. tall; leaves numerous, clustered at the base of the plant, very rough, 2–7 mm. wide; spikes very numerous, in decom-pound panicles, androgynous, 5–10 mm. long, 3–4 mm. wide; scales ovate, striate, cuspidate or acute; perigynia narrowly obovoid, sharply trigonous in cross section, not inflated, bright green, bicarinate, many-nerved, stipitate, abruptly rostrate, the beak strongly bidentate, half as long as the body or shorter.

This is the only species of *Carex* that is common in Central America, and it is found in all the countries of Central America.

***Carex polystachya* var. *Bartlettii*** (O'Neill) Standl. & Steyerf. Ceiba 4: 68. 1953. *C. Bartlettii* O'Neill, Carnegie Inst. Wash. Publ. 522: 255. f. 1. 1940.

Type from El Cayo, British Honduras, at edge of mountain pine ridge, *Bartlett 11718A*; collected also near Vaca, El Cayo District, *Gentle 2321* in part. In Guatemala known only from rocky forested banks, at 350 meters, Alta Verapaz (vicinity of Secanquim, *Maxon & Hay 3214*).

Differing from *C. polystachya* only in having scaberulous perigynia.

The position of this plant still is obscure because of the lack of adequate material, but even so, it can scarcely be regarded as more than a variety of *C. polystachya*, and it is possible that it should be reduced to synonymy under *C. scabrella*. However, the general appearance of the plant and its gross characters seem to ally it rather with *C. polystachya*. It is significant that *Gentle 2321* consists of plants with glabrous perigynia and others with scaberulous ones, indicating, probably, that the two forms were growing together.

***Carex praegracilis*** Boott, Bot. Gaz. 9: 87. 1884.

Moist meadows or in boggy borders of streams, 2100–3500 meters; Huehuetenango (Sierra de los Cuchumatanes: Cerro Chemalito; Tunimá; Nucá). Western United States; Mexico; South America.

Plants with stout long-creeping blackish rhizomes, the culms 20–70 cm. high, arising singly or in small clumps, acutely trigonous, slender but stiff, usually rough-

ened on the angles above, generally longer than the leaves; leaf blades erect-ascending, 10–25 cm. long, 1.5–3 mm. wide, light green, rather thick, rough on the margins; spikes 5–15, densely aggregate, all crowded together or the lowest slightly separated, subobtusate, 4–8 mm. long, 4–6 mm. broad, the terminal staminate flowers inconspicuous; scales ovate, light chestnut-brown with conspicuous hyaline margins and a lighter midrib, the lower ones cuspidate, the upper acuminate, wider and longer than the perigynia and usually completely concealing them; perigynia plano-convex, ovate or ovate-lanceolate, 3–4 mm. long, 1.5 mm. wide, erect-ascending, stramineous or at maturity brownish black, slightly several-nerved dorsally, sharp-edged, the margins serrulate above the middle, tapering into a serrulate beak half as long as the body of the achene or longer; achenes lenticular, obovoid, about 1.2 mm. long; stigmas 2.

**Carex quichensis** F. J. Hermann, Journ. Wash. Acad. Sci. 40: 284–285. 1950.

Edge of brook, 2333 meters; endemic; El Quiché (type collected above Nebaj, A. J. Sharp 45144).

Densely cespitose from slender, pale brown rootstocks; culms 1.8–4 dm. high, erect, shorter than the leaves, smooth, bluntly triangular; sterile shoots conspicuously developed; leaves 3–5 to a fertile culm, the blades flat, linear, erect, 9–20 cm. long, 3.5–6 mm. wide, scaberrulous on the margins toward the apex, the lower sheaths loose, hyaline and soon breaking ventrally, the ligule not conspicuously prolonged, blunt, as long or twice as long as wide, 14–25 mm. long, 1.5–2 mm. wide, terminal spike staminate, linear, erect, 14–25 mm. long, 1.5–2 mm. wide, borne on a peduncle 3–5 mm. long, the scales elliptic-oblong, 4 mm. long, appressed, hyaline, tinged with reddish brown, the broad dark green, often somewhat carinate midrib smooth and extended as a mucro; lateral spikes 3–4, erect, pistillate or often androgynous, the lowermost widely separate on a capillary peduncle, the upper short-peduncled, linear, 20–30 mm. long, 3.5–5 mm. wide at maturity, 15–30-flowered, the perigynia appressed-ascending; bracts leaf-like, overtopping the inflorescence, the blade of the lowermost 15–20 cm. long, the sheaths, except the uppermost, very long (to 45 mm.), prolonged at the mouth and with a prominent ligule; scales broadly elliptic-lanceolate, acuminate, 3 mm. long, nearly equaling the perigynia, thin and hyaline, the margins streaked with dark red, the midrib stout, green, generally more or less carinate, extending to or prolonged slightly beyond the tip; perigynia broadly ellipsoid to narrowly obovoid, 3.2 mm. long, 1.3–1.5 mm. wide, sessile, conspicuously many-nerved, subcoriaceous, little inflated, olive-green, glabrous, tapering at the base, abruptly contracted above into a short (0.35 mm.), stout, straight, subentire beak conspicuously thickened at the mouth; achenes trigonous, narrowly obovoid, 2 mm. long, 1 mm. wide, stramineous, granular, tapering to the stipitate base, rounded at the apex, bent-apiculate and jointed with the slender style; stigmas 3, short, dark red.

**Carex scabrella** Wahl. Kongl. Akad. Handl. 24: 149. 1803.

Known only from rocky slopes, Jalapa, Potrero Carrillo north-east of Jalapa, 1500–1700 meters, *Steyermark* 33117. Greater Antilles.



Plants densely cespitose, from thick hard rootstocks, the weak, very slender culms 10–40 cm. tall; leaves very numerous, clustered at the base of the plant, pale green, rather thin, long-attenuate, 1.5 mm. wide or less; spikelets usually numerous, in spike-like panicles, the upper panicles sessile, the lower long-pedunculate, the spikelets androgynous, each with 3–6 ascending perigynia; scales ovate, acutish, often awned, several-nerved; perigynia 3–4 mm. long, obovoid, acutely trigonous in cross section, not inflated, conspicuously costate, tapering to the base, narrowed into a bidentate beak about 1 mm. long.

The Alta Verapaz specimen (vicinity of Secanquim, *Maxon & Hay 3214*), once determined by Mackenzie as *C. scabrella*, has been examined by the writers and seems instead referable to *C. polystachya*.

**Carex Steyermarkii** Standl. Field Mus. Bot. 23: 196. 1947.

Known only from the type, Huehuetenango, Cerro Huitz, between Barillas and Mimanhuitz, Sierra de los Cuchumatanes, 1600–2600 meters, *Steyermark 48542*.

Plants apparently cespitose, the culms stout, erect, about 50 cm. high, striate, smooth; leaves very large and broad, numerous about the base of the culm and crowded, apparently erect, as much as 40 cm. long, about 16–24 mm. wide, flat, rather thick, pale green when dried, somewhat lustrous above, paler beneath, with a conspicuous costa, smooth on the margins, somewhat dilated and sheathing at the base, deep brown-red near the base; spikes rather numerous and forming a large lax inflorescence, pendulous on long slender peduncles, androgynous, elongate-linear, as much as 6 cm. long, laxly flowered or the lower flowers remote; scales lance-oblong, acute, inconspicuously mucronate or muticous, pale sordid brownish or pale greenish brown; perigynia fusiform-lanceolate, about 5 mm. long and slightly more than 1 mm. broad, pale sordid brown, conspicuously nerved, lustrous, gradually attenuate to a short stout erect beak, obtusely triangular in cross section; stigmas 3.

The type specimen consists of a single much-weathered plant, in which it is difficult if not impossible to determine the true characters of the spikes and the general form of the inflorescence. The species is evidently a distinct one, outstanding because of its extremely broad leaves, among the widest to be found in the genus. It is believed that the relationship is with *C. huehueteca* Standl. & Steyermark.

**Carex Thurberi** Dewey in Torr. Bot. Mex. Bound. Surv. 232. 1859.

In marshes, 1350–2500 meters; Alta Verapaz (near San Cristóbal, Tactic, and Cobán); Baja Verapaz (region of Patal); Huehuetenango. Arizona and Mexico; Dominican Republic.

Plants rather robust, from short thick rootstocks, the stout culms 60–100 cm. tall, the basal sheaths purplish and filamentose; leaves numerous, strongly septate-

nodulose, the blades often 30–60 cm. long, 8–18 mm. wide, light green, rough; terminal spike staminate, linear, 2–3 cm. long, the lateral spikes 3–6, approximate, spreading or drooping, oblong-cylindric, light green, densely many-flowered; scales ovate-lanceolate, rough-awned; perigynia ovoid-lanceolate, 4.5 mm. long, trigonous, scarcely inflated, subcoriaceous, strongly costate, obliquely short-stipitate, tapering into a strongly bidentate beak 2 mm. long, its teeth erect, stiff, 1 mm. long.

Abundant about the margins of the swamps of the Patal region. The spikelets, like those of *C. polystachya*, often are attacked by a smut. This species has been reported from Guatemala under the name *C. polysticha* Boeckl.

***Carex tojquianensis* Standl. & Steyerm. Ceiba 4: 64. 1953.**

Dry rocky grassy slopes, Sierra de los Cuchumatanes, 3700 meters; endemic; Huehuetenango (type collected between Tojquiá and Caxín bluff, summit of Sierra de los Cuchumatanes, 3700 meters, August 6, 1942, *Steyermark 50150*; in Herbarium of Chicago Natural History Museum. Paratypes: same locality, on Caxín bluff, August 6, 1942, *Steyermark 50175, 50176*; in Herbarium of Chicago Natural History Museum).

Loosely cespitose and substoloniferous, the stolons stout with dark blackish-brown or purplish-black scales, the culms 2.5–5.5 dm. high, 2–3 mm. thick below middle, erect, triangular, glabrous, exceeding the leaves, the lower and basal sheaths not filamentose; leaves with well-developed blades 7–10 to a fertile culm, coriaceous, stiff, strongly keeled beneath and channeled above, subrevolute, 1–2.5 dm. long, 2.5–4 mm. wide, glabrous, long-attenuate, the sheaths dark blackish-brown or brown-purple at base, striate; inflorescence 5–12 cm. long, spikes 3–4, androgynous, usually single, spreading or drooping on unequal, elongated, slender, smooth peduncles mostly longer than the spikes, the spikes linear-oblong, 2–3.5 cm. long, 4–6 mm. wide, closely and densely flowered, the upper one-fourth or one-fifth staminate, the perigynia appressed-ascending; lower bract leaf-like, long-sheathing, 7–11 cm. long, 1–1.5 mm. wide, the upper short-sheathing; pistillate scales oblong-lanceolate, obtuse to subacute, dark brown-purple with prominently nerved pale green center and very narrow hyaline margins, about the same width or slightly narrower than and about equaling the length or slightly exceeding the perigynia, 3–3.25 (–5) mm. long, 1.25–1.5 mm. wide; staminate scales similar; perigynia elliptic-oblong or elliptic-lanceolate, compressed-triangular, not inflated, 3–3.5 mm. long, 1.25–1.5 mm. wide, stramineous or buff-greenish throughout or prominently reddish-brown dotted in lower half, 2-keeled, the mature perigynia strongly or faintly several-nerved on one or more sides, sometimes in the lower portion only, otherwise nerveless, narrowed at the base, substipitate, glabrous or the uppermost part minutely hispidulous on margins, tapering into the oblique subentire beak, 0.3–0.6 mm. long; achenes elliptic-oblong, 2.25–2.5 mm. long, 1.25 mm. wide, nearly filling the perigynium body, triangular, rounded at base, apiculate, jointed with the slender style; stigmas 3, brownish.

**Carex tunimanensis** Standl. & Steyerl. *Ceiba* 4: 65. 1953.

Open alpine meadows, along rivulets, Sierra de los Cuchumatanes, 3300–3500 meters; endemic; Huehuetenango (type collected in alpine areas in vicinity of Tunimá, Sierra de los Cuchumatanes, 3400–3500 meters, July 7, 1942, *Steyermark* 48334; in Herbarium of Chicago Natural History Museum. Paratypes: near Tunimá, July 6, 1942, *Steyermark* 48283; along rivulet, alpine meadows just northwest of Chancol, July 6, 1942, *Steyermark* 48251; in Herbarium of Chicago Natural History Museum).

Cespitose, the culms 0.9–2.5 dm. high, 1–1.5 mm. thick below the middle, erect, triangular, glabrous, exceeding the leaves; leaves numerous, mostly clustered at the base of the culm, the blades stiff, the lower spreading, 5–10 cm. long, 2.5–5.5 mm. wide, the margins rough-serrulate, sheaths brown and conspicuously striate at base, spreading in age; inflorescence up to 3.5 dm. long, spikes 4–7, the terminal and uppermost ones androgynous with few pistillate flowers, the others pistillate, single or in 2's, at first erect, in maturity ascending, eventually remotely separated on elongated, slender, straight or flexuous, glabrous peduncles which are solitary or in pairs and in maturity mostly exceed the spikes, the lower peduncles at maturity eventually loosely spreading or cernuous, the spikes oblanceolate-clavate to clavate-cylindric, densely flowered, 1.5–3 cm. long, 4–8 mm. wide; the terminal and uppermost spikes erect, on peduncles 1–1.5 cm. long, the staminate scales membranaceous, lustrous, obovate, acute, 5–5.5 mm. long, 1.5–2 mm. wide, appressed-ascending, ferruginous with a pale green carinate center, the margins white-scarious; pistillate spikes on long-exserted, slender, capillary peduncles up to 8 cm. long, exceeding the spikes, the perigynia ascending; bracts long-sheathing, with a prolonged closed and tubular sheath 15–26 mm. long and prolonged at the brown orifice with a conspicuous ligule, the lowest ones 6–9 cm. long, leaf-like, the upper ones greatly reduced; perigynia fusiform, 5–5.5 mm. long, 1.25–1.5 mm. wide, trigonous and 3-ribbed, slightly 1-nerved on at least two sides, coriaceous, pale green, glabrous, tapering into a conspicuous beak 2.5 mm. long, conspicuously bidentate at the apex, the hyaline teeth 0.6–0.7 mm. long; achene trigonous, oblong-elliptic, 2 mm. long, 1 mm. wide, stramineous, not filling the perigynium, jointed with the style; stigmas 3.

**Carex venosivaginata** Standl. & Steyerl. *Ceiba* 4: 67–68. 1953.

On mossy bluffs in upper reaches of barrancos and mossy ground in cloud forests, Sierra de los Cuchumatanes, 2400–2600 meters; endemic; Huehuetenango (type collected in cloud forest, Cerro Huitz, between Mimanhuitz and Yulhuitz, Sierra de los Cuchumatanes, 2600 meters, July 14, 1942, *Steyermark* 48554; in Herbarium of Chicago Natural History Museum. Paratype: on high bluffs in upper reaches of barranco, above San Juan Ixcay, Sierra de los Cuchumatanes, 2400 meters, August 4, 1942, *Steyermark* 50062; in Herbarium of Chicago Natural History Museum).



Loosely cespitose with short rootstocks, the culms 2.5–6 dm. high, 1–1.5 mm. thick below middle, slender at base, erect, triangular, the angles and sides smooth, strongly purple-tinged at base, the lower sheaths breaking and very slightly filamentose; leaves with well-developed blades 5–10 to a fertile culm, septate-nodulose, the lower clustered at the base, the blades erect, firmly membranaceous to subcoriaceous, septate-nodulose, flat with subrevolute scabrous margins, 1–1.5 dm. long, 2.5–4.5 mm. wide, the sheaths glabrous; spikes 4–6, mostly appearing androgynous, widely separate, in pairs or single, elongate-linear, 1.5–4 cm. long, 3.5–4 mm. wide, closely flowered above, loosely at base, the upper fourth to fifth staminate; lower bract leaf-like, long-sheathing, exceeded by the culm, the upper much reduced; staminate scales membranaceous, obovate, mucronate to abruptly acuminate, 4–4.25 mm. long, 1.5 mm. wide; pistillate scales membranaceous, broadly ovate to suborbicular-ovate, abruptly acuminate, 2.6–3 mm. long, about 2 mm. wide, subcucullate, carinate; perigynia narrowly oblong-elliptic, 3 mm. long, about 1 mm. wide, obtusely trigonous, tapering to a somewhat rounded base, glabrous, tapering into a smooth short beak 0.8–1 mm. long, obliquely cut, at length minutely bidentate, puncticulate, 2-ribbed, strongly 3–4-nerved on each face with elevated nerves; achenes elliptic-oblong, 1.9–2 mm. long, 1 mm. wide, trigonous, rufous-brown, filling about four-fifths of the perigynium body, apiculate, jointed with the slender style; stigmas 3.

This species may be related to *C. perlonga* Fernald, from which it differs in the glabrous septate-nodulose sheaths, culms, and leaves (except for their serrulate margins), shorter perigynia with shorter beaks, and more remote spikes.

**Carex xalapensis** Kunth, Enum. Pl. 2: 380. 1837. *C. involu-crattella* Mackenzie, Cariceae, N. Amer. Fl. 18: 50–51. 1931.

At 2000 meters; Huehuetenango ("Los Pinitos," southeast of Huehuetenango, *Steyermark 48131*). Central Mexico.

Plants cespitose, the rootstocks short-creeping, fibrillose, the culms 1.8–1.9 dm. high, rather slender, 2–3 mm. thick and dull brown at base, sharply triangular, roughened above, equaling to exceeding the leaves; leaves with well-developed blades 5–8 to a culm, all on the lower third, the blades stiff, 1–3.5 dm. long, 2–5 mm. wide, roughened on margins, the sheaths tight, not septate-nodulose dorsally or cross-rugulose ventrally; spikes closely aggregated into an ovoid to broadly oblong head 1.5–3.5 cm. long and 0.9–1.5 cm. thick, the individual spikes 6–20, scarcely distinguishable, androgynous, with 10–20 appressed to spreading perigynia, the staminate flowers very inconspicuous; 1–4 of the lower bracts developed, setaceous, slightly enlarged at base, 1–4 cm. long, usually shorter than the inflorescence; pistillate scales ovate, acuminate or short-cuspidate, somewhat narrower than and about length of bodies of perigynia, reddish- or yellowish-brown, with a 3-nerved green center and narrow hyaline margins; perigynia plano-convex, the main body ovate to suborbicular, light green or yellowish-brown at maturity, 3–4.25 mm. long, 2–3 mm. wide, nerveless ventrally, faintly few-nerved dorsally, substipitate to definitely abruptly short-stipitate at the truncate to rounded base, serrulate above the middle, abruptly narrowed into a serrulate, narrowly bidentate beak about half the length of the body; achenes lenticular, filling perigynium body, quadrate-suborbicular, 1.5–2 mm. long, geniculate with the slender style; stigmas 2.

In the single Guatemalan specimen cited, the bases of the perigynia are more markedly stipitate than in other collections of *C. xalapensis*, but there is variation in this character. *Carex involucratella* Mackenzie apparently represents only a more luxuriant form of *C. xalapensis*, having somewhat larger perigynia, inflorescences, and bracts, but is believed to represent the type of variation normally occurring in *C. xalapensis*.

### CLADIUM R. Brown

Tall coarse perennials with thick rhizomes; leaves long and narrow, rough-margined; flowers perfect, small, dark brown or blackish, fasciculate along the branches of a terminal panicle, axillary panicles also often present; spikelets mostly 1-3-flowered, usually only the lowest flower fertile; scales imbricate, the lowest usually empty; perianth represented by slender bristles, or these absent; stamens normally 3; style continuous with the ovary, dilated at the base, the basal portion sometimes persistent as a tubercle, the style branches 3; achene oblong or ovoid, somewhat drupe-like, smooth, ecostate or trigonous.

About 30 species in tropical and temperate regions of both hemispheres. Only one species known from Central America.

**Cladium jamaicense** Crantz, Inst. Herb. 1: 362. 1766. *Schoenus Cladium* Swartz, Prodr. Veg. Ind. Occ. 19. 1788. *S. effusus* Swartz, loc. cit. *Mariscus jamaicensis* Britton in Britt. & Brown, Ill. Fl. 1: 348. 1913. *Saibal* (Petén, fide Lundell).

Swampy shores of streams or in inland marshes or swampy savannas, ascending from sea level to about 1500 meters; Petén; Baja Verapaz; Alta Verapaz; Izabal; Huehuetenango. Southeastern United States through Mexico to British Honduras and Panama; West Indies and South America, and in the Old World tropics.

Plants very coarse and stout, arising from short thick rhizomes, the culms 1-3 meters tall, usually 1-2.5 cm. thick below, obscurely trigonous; cauline leaves numerous, 60-120 cm. long, 6-20 mm. wide, thick and hard, very scabrous on the margins, the sheaths glabrous, often reddish or ferruginous; panicles umbelliform, several, decompound and lax; spikelets in clusters of 2-10 or solitary at the ends of the ultimate branches, narrowly ovoid, acute, terete, 4-5 mm. long, bright brown, the lower 6-8 scales empty; perianth none; stamens 2, the anthers 3 mm. long; achene 2 mm. long, ovoid, acute, brown, somewhat rugose.

The plant often grows in shallow water of swamps. There is a very large stand of it in the great swamp near Patal, Baja Verapaz, shortly above Tactic, where it constitutes the greater part of the vegetation of the whole swamp. The saw-like edges of the stiff leaves cut the skin and flesh painfully if one is careless in walking through

the stands of the plant. In the United States it is known by the name "sawgrass." In Florida the tough leaves are utilized for weaving baskets and other articles, and it seems probable that they have been used also by the Guatemalan Indians. The Maya name is reported from Yucatan as "holche."

## CYPERUS L.

*Reference:* Kuekenthal, Pflanzenreich IV. 20: 1-671. 1935-36.

Annuals or perennials, with rhizomes or with fibrous roots, the culms leafy near the base or leafless, not truly nodulose although falsely so in *C. articulatus*; bracts one to many at the base of the inflorescence, this umbellate or head-like; spikelets usually 2-many-flowered, rarely 1-flowered, the scales distichous, the lowest 1-2 sometimes empty, the succeeding ones containing a single perfect flower, the uppermost sometimes sterile or empty; stamens 1-3; perianth none; style bifid or trifid, not enlarged at the base, usually caducous; achene lenticular or trigonous.

About 600 species, in almost all parts of the earth but most numerous in tropical or subtropical regions. A few species besides those listed here are found in southern Central America. While the subgenera usually recognized in the genus are rather natural ones, and in theory sharply defined, as a matter of fact they are often difficult of recognition in dried specimens. No key that may be made for separating the species will be found easy for use, and probably no one with even the best of keys can be certain of determinations in the majority of cases except by comparison with authentically named specimens.

### KEY TO THE SUBGENERA

Style 2-cleft; achene compressed or biconvex . . . . . II. *Pycreus*

Style 3-cleft; achene trigonous.

Rachilla of the spikelet persistent, not separating from the axis to which it is attached, not breaking up into separate joints . . . . . I. *Eucyperus*

Rachilla of the spikelet deciduous from the axis and articulate with it.

Rachilla articulate only at or near the base . . . . . III. *Mariscus*

Rachilla breaking up into several joints . . . . . IV. *Torulinium*

#### I. *Eucyperus*

Spikelets arranged in elongate spikes.

Spikes cylindric, like the spikelets very numerous; wings of the rachilla usually colored.

Spikelets usually divergent, oblong-lanceolate, compressed; rachilla narrowly winged . . . . . *C. imbricatus*

Spikelets suberect, linear, terete or subterete; rachilla broadly winged.

Spikelets divergent; spikes 1.5-2 cm. broad . . . . . *C. digitatus*

Spikelets ascending; spikes about 8 mm. broad . . . . . *C. semiochraceus*



Spikes broadly ovate or turbinate, like the spikelets relatively few.

Plants tall and coarse, usually a meter high or more; scales rather remote.

*C. proluxus*

Plants small, mostly 30–50 cm. tall; scales densely imbricate.

Plants with repent rhizomes. . . . . *C. rotundus*

Plants with fibrous roots. . . . . *C. esculentus*

Spikelets fasciculate or digitate upon a very short rachis, never in elongate spikes.

Plants leafless; culms spongy and when dry appearing nodose-septate.

*C. articulatus*

Plants usually leafy; culms neither spongy nor septate.

Spikelets collected in a single dense head.

Scales muticous. . . . . *C. tenerimus*

Scales mucronate.

Plants annual; culms not thickened at the base. . . . . *C. humilis*

Plants perennial; culms thickened at the base.

Scales not closely appressed, with somewhat outcurved tips.

*C. uncinatus*

Scales appressed, the tips not outcurved.

Spikelets white or pale yellowish; leaf sheaths blackish.

*C. seslerioides*

Spikelets golden brown; leaf sheaths purplish brown or paler.

*C. Arsenii*

Spikelets variously arranged but not in a single head.

Plants annual.

Spikelets green. . . . . *C. compressus*

Spikelets brown or castaneous.

Culms very slender, about 1 mm. thick. . . . . *C. amabilis*

Culms stouter, 2–3 mm. thick. . . . . *C. haspan*

Plants perennial.

Culms subterete, leafless.

Flowers perfect; cultivated plants. . . . . *C. alternifolius*

Flowers dioecious; native plants. . . . . *C. canus*

Culms conspicuously trigonous or triquetrous.

Scales incurved or loosely tortuous at the apex.

Culms much shorter than the umbels. . . . . *C. simplex*

Culms much longer than the umbels. . . . . *C. Lundellii*

Scales straight, not incurved at the apex, acute or cuspidate-mucronate.

Spikelets turgid; scales with numerous conspicuous nerves.

*C. diffusus*

Spikelets strongly compressed; scales not strongly nerved.

Culms and leaves evidently viscid, at least in the fresh state.

Spikelets 10–20 mm. long. . . . . *C. oxylepis*

Spikelets 5–8 mm. long. . . . . *C. elegans*

Culms and leaves not at all viscid.

Spikelets 1–1.5 mm. wide. . . . . *C. haspan*

Spikelets 2 mm. wide or often much wider.

Scales conspicuously red-lineolate, not evidently cellulose-reticulate; stamens 3. . . . . *C. Lundellii*

Scales conspicuously cellulose-reticulate, not red-lineolate; stamen 1.

Spikelets at maturity oblong-linear to oblong-lanceolate, densely aggregate and radiating, never forming glomerate-lobate heads.

Leaves 2-4 mm. wide, scarcely or not septate-nodulose; scales rugulose; spikelets 2 mm. wide . . . *C. ochraceus*

Leaves 6-10 mm. wide, conspicuously septate-nodulose; scales not rugulose; spikelets 2.5-3 mm. wide.

*C. virens*

Spikelets ovate or lance-ovate, densely glomerate and forming lobate heads.

Scales oblong-lanceolate, the apex excurrent into a minute excurved mucro . . . . . *C. pseudovegetus*

Scales acute or short-mucronate, the apex straight or incurved.

Scales straight, not incurved at the apex; leaves 2-3 mm. wide . . . . . *C. surinamensis*

Scales incurved at the apex; leaves 3-6 mm. wide.

*C. Luzulae*

## II. *Pycreus*

Spikelets 3-5 mm. wide; achene black . . . . . *C. unioides*

Spikelets 1.5-2.5 mm. wide.

Superficial cells of the achene rectangular, oblong, the achene transverse-undulate.

Scales castaneous or deep brownish . . . . . *C. piceus*

Scales yellowish . . . . . *C. flavescens*

Superficial cells of the achene hexagonal, the achene (as seen beneath a lens) reticulate or punctulate.

Scales castaneous or blackish.

Spikelets loosely spicate, the spikelets usually distant in the spikes.

*C. rivularis*

Spikelets densely spicate, the whole inflorescence head-like . . . . . *C. niger*

Scales greenish or yellowish, pale.

Rachilla not winged; achene obovate, 0.6 mm. wide, rounded at the apex; spikelets about 2 mm. wide . . . . . *C. lanceolatus*

Rachilla with hyaline wings forming a collar at the base of each achene; achene oblong-obovate, 0.4 mm. wide, subtruncate at the apex; spikelets about 1.5 mm. wide . . . . . *C. polystachyos*

## III. *Mariscus*

Culms pillose and somewhat septate when dried; leaves very coriaceous, pale green; plants coarse and stout, often a meter high . . . . . *C. ligularis*

Culms neither pillose nor septate; leaves not thick-coriaceous.

Plants annual, often low and 15 cm. tall or less.

Plants mostly 15 cm. tall or less; spikelets capitate . . . . . *C. aristatus*

Plants usually much taller; spikelets spicate . . . . . *C. panamensis*

Plants perennial, usually taller.

Scales not closely appressed, or at least the apex not appressed.

Spikelets oblong or lance-oblong. . . . . *C. Fendlerianus*

Spikelets ovate.

Scales dark red. . . . . *C. Bernoullii*

Scales whitish or fulvous.

Scales mucronulate from an excised apex and appearing tridentate,  
dirty white; culms slender, smooth. . . . . *C. ischnos*

Scales rounded at the apex, yellowish; culms rigid, often very rough.  
. . . . . *C. manimae*

Scales closely appressed for their whole length.

Achene linear, almost 2 mm. long and 0.4 mm. wide; leaves 2-3 mm. wide;  
spikelets 4-8-flowered, only 1 mm. wide; plants usually low and 30 cm.  
tall or less. . . . . *C. tenuis*

Achene oblong to obovoid, 0.6-1 mm. wide; leaves 3-10 mm. wide; spike-  
lets 1-30-flowered, 1-2.5 mm. wide.

Spikes subglobose, about as broad as long. . . . . *C. globulosus*

Spikes cylindric, often greatly elongate, at least longer than broad.

Scales 4-4.5 mm. long; spikelets 4-8-flowered, usually very distant on  
the rachis; leaves 2-10 mm. wide. . . . . *C. lentiginosus*

Scales 2-3.5 mm. long.

Spikelets 1-3-flowered.

Spikelets 5-10 mm. long. . . . . *C. hermaphroditus*

Spikelets 3-5 mm. long.

Spikelets becoming turgid at maturity, ascending, at least in age;  
achene obovate or ovate. . . . . *C. flavus*

Spikelets not turgid at maturity, divaricate from the first;  
achene oblong or ellipsoid.

Spikelets linear-lanceolate, 2.5-3 mm. long; achene oblong.  
. . . . . *C. pallens*

Spikelets oblong-elliptic, 3-5 mm. long; achene broadly oblong  
or ellipsoid. . . . . *C. Mutisii*

Spikelets containing 5 or more flowers. . . . . *C. hermaphroditus*

#### IV. *Torulinium*

Achene linear; scales usually distant, the apex of one scale not reaching the base  
of the one next above on the same side of the rachilla; wings of the rachilla  
linear, reaching the top of the achene. . . . . *C. acicularis*

Achene oblong or obovoid; scales imbricate on the same side of the rachilla; wings  
of the rachilla elliptic, often not extending beyond the middle of the achene.

Inflorescence consisting of a single large subglobose head. . . . . *C. macrocephalus*

Inflorescence with some stalked heads of spikelets.

Spikelets divaricate, scattered along the rachis of the spike. . . . . *C. odoratus*

Spikelets erect or suberect, densely crowded. . . . . *C. Eggersii*

**Cyperus acicularis** (Schr.) Steud. Syn. 45. 1855. *Diclidium*  
*aciculare* Schrad. ex Nees in Mart. Fl. Bras. 2, pt. 1: 55. 1842.  
*C. ferax* var. *acicularis* Kuekenenthal, Pflanzenreich IV. 20: 619. 1936.



Jutiapa, in ditch near Jutiapa, 900 meters. Yucatan and British Honduras; Brazil.

Plants perennial, with a short thick rhizome, the culms 30–90 cm. tall, 3–5 mm. thick at the apex, stout, smooth, leafy; leaves 3–5 to each culm, 15–80 cm. long, 5–20 mm. wide, flat, rough-margined; bracts 6–8 and 10–60 cm. long, 5–20 mm. wide; rays of the umbel 4–12, branched, unequal, the peduncles short or elongate; spikes 2–5 cm. long, 2–3.5 cm. wide, usually lax; spikelets mostly distant, divergent or reflexed, 5–25 mm. long, linear or acicular, the rachilla breaking up into 1-fruited joints, winged; scales 2 mm. long, ovate, imbricate or distant, mucronulate, brown or reddish brown; achene linear or linear-oblong, 1.7 mm. long, 0.3–0.4 mm. wide, brown, trigonous, minutely puncticulate.

Perhaps only a form of *C. odoratus* (*C. ferax*), with which it was united by Kuekenenthal.

***Cyperus alternifolius* L. Mant. Pl. 2: 28. 1771.**

Frequently cultivated for ornament, principally in fountains of patios. Native of Africa, but cultivated for ornament in many other parts of the earth, even in temperate regions.

Plants coarse, perennial, with very short, thick rhizomes, the culms 30–150 cm. tall, 1–5 mm. thick at the apex, trigonous but the angles obtuse or rounded; leaves reduced to sheaths, these reddish brown, coarsely nerved; bracts usually 18–20 and 10–30 cm. long, subequal, 15 mm. wide or less, rough on the margins and costa, deflexed at maturity; rays as many as the bracts, 2–10 cm. long, subequal, with a few short raylets; spikelets 3–12 in the head, ovate-lanceolate to linear-lanceolate, 5–10 mm. long, 12–30-flowered, acute, compressed, the rachis not winged; scales ovate to lanceolate, imbricate, thin-chartaceous, 3–5-nerved, subacute, pale or with reddish brown spots; achene 0.6–0.9 mm. long, trigonous, dark brown, minutely cellular, short-apiculate.

Called “tule de jardín” in El Salvador. O'Neill states that the species is found in Yucatan in “waste places; introduced,” but there is no apparent evidence that it grows in Mexico and Central America outside gardens. It very closely resembles *C. canus*, and it is not easy to decide which species is represented unless the source of the specimens is known. Also in cultivation in Guatemala, apparently, is *Cyperus Papyrus* L., the giant papyrus of the Nile, from which the ancient Egyptians prepared a kind of paper for their manuscripts. That species, however, is not closely similar to *C. alternifolius*, but does resemble and is related to the native *Cyperus giganteus*.

***Cyperus amabilis* Vahl, Enum. Pl. 2: 318. 1806. *C. aureus* HBK. Nov. Gen. & Sp. 1: 205. 1815. *C. glareosus* Liebm. Vid. Selsk. Skrivt. V. 2: 204. 1851. *C. aureus a macrostachyus* Boeckl. Linnaea 35: 494. 1868. *C. amabilis* var. *macrostachyus* Kuekenenth. Pflanzenreich IV. 20: 266. 1936.**

Open, grassy and rocky slopes, or in wet sand along streams, 2500 meters or less; Zacapa; Santa Rosa; Escuintla; Guatemala; Sacatepéquez; Chimaltenango; Suchitepéquez; Quezaltenango; Huehuetenango. Arizona and Mexico to Costa Rica; West Indies and South America; tropical Asia and Africa.

Plants annual, slender, the culms more or less cespitose, few or numerous, 5–15 cm. tall, obscurely trigonous, smooth; leaves 1–2 near the base of the culm, very narrow, the sheaths reddish; bracts 3–6, foliaceous, usually shorter than the inflorescence; rays of the umbel 10 or fewer, simple or compound, 1–8 cm. long; spikelets digitately clustered at the ends of the rays, linear, 8–18 mm. long, scarcely more than 1 mm. wide, compressed, subacute, many-flowered, the rachilla not winged; scales rather laxly imbricate, spatulate, orange or ferruginous, truncate and excised at the apex, short-mucronulate; achene obovate or obovate-oblong, trigonous, brown, whitish-puncticulate, rounded at the apex and minutely apiculate.

The Guatemalan material belongs to var. *macrostachyus* (Boeckl.) Kuekenh., in which the costa of the glumes is excurrent as a straight or excurved mucro.

**Cyperus aristatus** Rottb. Descr. & Icon. 4: 23. 1773. *C. uncinatus* R. Br. Prodr. 215. 1810, not Poir. *C. inflexus* Muhl. Descr. Gram. 16. 1817.

Sandy plains along river; Huehuetenango (near Cuilco). United States and Mexico; West Indies; South America; Old World tropics.

Plants annual, glabrous, aromatic when drying, the culms densely cespitose or separated, mostly 5–15 cm. tall, about 1 mm. thick, smooth; leaves 2–6 to each culm, 10–15 cm. long, 2 mm. wide or less, flat, smooth on the edges, the sheaths purplish brown; bracts 2–5, unequal, 1.5–8 cm. long; rays few and simple, or the inflorescence consisting of a single head, this 5–20 mm. broad, usually very dense; spikelets 5–40, mostly 2–3 mm. wide, compressed, 5–16-flowered, the rachilla zigzag, very narrowly winged; scales oblong-spatulate, reddish brown, 7–9-nerved, with hyaline margins, with a conspicuous excurved mucro; achene about 1 mm. long, oblong, trigonous, dark brownish purple, minutely puncticulate, stipitate, scarcely apiculate.

From Yucatan there are reported the Maya names “chabxan,” “chabxaan,” and “cabaxan.”

**Cyperus Arsenii** O'Neill & Benedict, Leaf. West. Bot. 4: 33. 1944.

Dry plains or hillsides, 200 meters; Zacapa (near Estanzuela, *Steyermark 29095*). Central Mexico.

Plants perennial, with short repent rhizomes; culms very slender, 8–15 cm. high, 2–3 mm. thick, minutely scaberulous at the apex, somewhat thickened at the base; leaves 5–10 cm. long, 0.3–0.8 mm. wide, antrorsely scabrous at the apex;

sheaths purplish, separating in age into fibers; bracts 2, very unequal, 1–5 cm. long; spikelets 5–7, forming a head 5–7 mm. in diameter, 4–5 mm. long, 1.5–2 mm. wide, oblong, obtuse, subcompressed, 8–17-flowered, the rachilla not winged; scales unequal, 1.3–1.6 mm. long, acute, broadly ovate, membranaceous, scarcely mucronulate, golden brown; stamen 1; style 3-fid; achene 0.6–1 mm. long, purplish fuscous, trigonous, obovoid or ovoid, minutely puncticulate.

**Cyperus articulatus** L. Sp. Pl. 44. 1753. *Cañutillo; Polol* (Petén, Maya).

Swamps or marshes, most often in shallow water at the margins of streams or lakes, at 1500 meters or less, usually at or little above sea level; Petén; Izabal; Chiquimula; Jutiapa; Guatemala; Huehuetenango. Southern United States to Mexico, British Honduras, and Panama; West Indies; South America; Old World tropics.

Plants coarse and stout, with long-creeping thick rhizomes, the culms mostly 1–2.5 meters tall, 4–15 mm. thick at the base, 2–3 mm. thick at the apex, terete, smooth, septate-nodose; leaves reduced to a few sheaths; bracts 2–3, scale-like, cuspidate, 5–15 mm. long; rays of the umbel 4–12, often branched, 12 cm. long or less; spikelets in clusters of 2–20, digitate, linear, 6–50 mm. long, 1 mm. wide, compressed, 12–40-flowered; scales brown, elliptic-ovate, obtuse, membranous, imbricate, 3–7-nerved, the keel green, the wings of the rachilla lanceolate; achene 1.3–1.5 mm. long, 0.5 mm. broad, trigonous, oblong, dark purplish brown, apiculate.

Called “sontul” in El Salvador. The thick spongy culms doubtless are used in Guatemala for making mats and other articles.

**Cyperus Bernoullii** Kuekenth. Pflanzenreich IV. 20: 464. 1936. *Mariscus guatemalensis* Clarke, Kew Bull. Add. Ser. 8: 16. 1908, not *C. guatemalensis* Steud. 1855. Type from Quezaltenango, *Bernoulli & Cario 1001*.

Plants perennial, with ligneous stolons 4–5 cm. long, the culms 30–40 cm. tall, rigid, setulose-scaberrulous; leaves shorter than the culms, 3 mm. wide, very scabrous; bracts 4, very scabrous, the lower ones longer than the inflorescence; inflorescence head-like, the spikes 3–4, ovate-globose, 1.5 cm. broad, very dense; spikelets numerous, spreading, linear-oblong, 6 mm. long, 1.7 mm. wide, subcompressed, about 10-flowered, the rachilla narrowly winged; scales rather remote, ovate, rounded-obtuse at the apex, dark red, faintly several-nerved; achene four-fifths as long as the glume, subobovate-oblong, trigonous, apiculate.

We have seen no material of this species, which is known only from the original collection.

**Cyperus canus** Presl, Reliq. Haenk. 1: 179. 1830. *Tule; Junquillo; Sivate; Say* (Cobán, Kekchí).

Damp thickets, wet fields, or frequently along stream banks, especially among rocks, sometimes planted, 200–1500 meters; Alta Vera-



paz; Baja Verapaz; Zacapa; Santa Rosa; Escuintla; Guatemala; Chimaltenango; Quiché; Retalhuleu; doubtless also in other departments. Mexico to Costa Rica; Colombia.

A glabrous perennial with short thick rhizomes, the culms robust, mostly 1–1.5 meters tall, 4 mm. thick at the apex, 6–10 mm. thick at the base, obtusely trigonous, multistriate, smooth or very minutely scaberulous, stiff; leaves reduced to sheaths at the base of the culm, these purplish brown; bracts 20–30 cm. long, 6–12 mm. wide, subequal; rays of the umbel 10–18, compound; staminate spikelets in digitate clusters of 3–8 at the ends of the raylets, 6–10 mm. long, 2.5–3 mm. wide, 10–40-flowered; pistillate spikelets 5–14 mm. long, 2–3 mm. wide; rachilla wingless; scales ovate, thin, acute, closely appressed, reddish brown; achene 0.5 mm. long and half as wide, trigonous-ellipsoid, dark brown.

Called “tule” and “tul de petate” in El Salvador. The plant is rather scarce in the wild state, but it is frequently planted in small patches or fields, especially in the Pacific *boca costa* and about Cobán. In Guatemala, as well as in other parts of Central America, the plant is of considerable utility and importance, chiefly for the weaving of the coarse mats used as beds. In Guatemala the mats called *petates ordinarios* are woven from it. The plant is a rather handsome and ornamental one, closely resembling *C. alternifolius*, as already remarked under that species.

### ***Cyperus compressus* L. Sp. Pl. 46. 1753.**

Moist open slopes, damp thickets, or in wet sand near streams, at 900 meters or less; Petén Izabal; Zacapa; Chiquimula; Jutiapa; Escuintla; Suchitepéquez; Sololá. United States to Mexico, British Honduras, and Panama; West Indies; South America; Old World tropics.

A low glabrous annual with fibrous roots, the culms mostly 5–15 cm. tall, about 1 mm. thick, smooth; leaves 1–4 at the base of the culm, about equaling the culm, 1.5–3 mm. wide, sometimes minutely scaberulous on the margins, the sheaths purplish brown; bracts 3–5, unequal, 1–3 mm. wide; rays of the umbel simple, 1–12 cm. long; spikelets in digitate clusters of 3–10, linear-oblong, 10–24 mm. long, 2–3 mm. wide, acute, compressed, the rachilla winged; scales firm, closely imbricate, ovate, 3–3.5 mm. long, acuminate and mucronate, the tips somewhat excurved, 9–13-nerved, green, the margins broadly white-hyaline; achene obovoid, trigonous, 1–1.3 mm. long, dark brown and shining, minutely puncticulate, subemarginate at the apex.

***Cyperus diffusus* Vahl, Enum. Pl. 2: 321. 1806. *C. tolucensis* HBK. Nov. Gen. & Sp. 1: 206. 1815. *C. umbrosus* Lindl. & Nees in Mart. Fl. Bras. 2, pt. 1: 31. 1842. *C. diffusus* var. *umbrosus* Kuekenh. Pflanzenreich IV. 20: 210. 1936. *C. diffusus* var. *tolucensis* Kuekenh. op. cit. 211. 1936. *Junquillo*.**

Wet thickets or shaded banks, often in moist forest, rarely in open places, 1300 meters or less, most common at low elevations; Alta Verapaz; Izabal; Santa Rosa; Escuintla; Suchitepéquez; Retalhuleu; Quezaltenango; San Marcos. Mexico to British Honduras and Panama; West Indies; South America; tropical Asia and Malaysia.

Plants perennial, glabrous, with short slender rhizomes, the slender or stout culms 20–50 cm. tall, about 1.5 mm. thick, trigonous, smooth; leaves 2–7 to each culm, shorter than or about equaling the culm, 3–9 mm. wide, flat, rough-margined, the sheaths reddish brown; bracts 5–8, unequal, 1–9 mm. wide; rays of the umbel 8–12, unequal, branched; spikelets solitary or in heads of 2–3, ovate to oblong, 4–10 mm. long, 1.5–2 mm. wide, green or pale green, 5–10-flowered, the rachilla not winged; scales ovate, membranous, 2–3 mm. long, cuspidate-mucronate, 7–9-nerved; achene 1.4 mm. long, trigonous-obovoid, dark brown, smooth, substipitate.

A common weedy plant in lowland thickets of Guatemala, as well as in Central America generally. It is one of the commonest *Cyperus* species of Central America. Of the varieties and subspecies proposed by Kuekenenthal the Guatemalan material, according to O'Neill, is referable to var. *tolucensis* (HBK.) Kuekenenth.

***Cyperus digitatus* Roxb. Hort. Beng. 81. 1814.**

Lake margins, Lago de Atescatempa, Jutiapa, 500 meters, *Steyermark* 31875. Southern Mexico; South America; Old World tropics.

A glabrous perennial with very short rhizomes, the culms more or less cespitose, stout, 50–150 cm. tall, trigonous, smooth, leafy at the base; leaves about equaling the culms, 5–15 mm. wide, coriaceous, the sheaths purple-brown; bracts 5–7, longer than the inflorescence; umbels compound or decompound, with 6–10 rays; spikes of spikelets cylindric, 3–6 cm. long, 1.5–2 cm. broad; spikelets numerous, divaricate, linear, acute, about 10 mm. long and 1–1.5 mm. wide, subcompressed-angular, the rachilla winged; scales densely imbricate, ovate or elliptic, membranaceous, stramineous, yellow, or rufous, 3–5-nerved, mucronate-cuspidate; achene one-half to three-fifths as long as the glume, oblong-elliptic, trigonous, fuscous, densely puncticulate, conspicuously apiculate.

***Cyperus Eggersii* Boeckel. Cyp. Nov. 1: 53. 1888.**

Wet or marshy soil, often along streams; Izabal; Petén. Texas to Campeche and British Honduras; Honduras; West Indies; Ecuador.

A coarse perennial, glabrous, with a very short, stout rhizome, the culms 20–90 cm. tall, 2–3 mm. thick at the apex, obtusely trigonous, sometimes rough on the angles; leaves 4–6 to a culm, 5–15 mm. wide, 12–60 cm. long, subcoriaceous, rough-margined, the sheaths reddish brown; bracts 5–8 and 4–10 mm. wide; umbel with 5–10 rays, these unequal, usually short, with 3–5 ovate or ovate-cylindric spikes congested into a dense head; spikelets numerous, oblong or linear-lanceolate, 6–10

mm. long, about 1 mm. wide, suberect, subterete, 3-9-flowered, the rachilla breaking up into 1-flowered joints; scales 2 mm. long, ovate, obtuse, sometimes mucronulate, clasping the achene, stramineous or lustrous brown; achene oblong, 1.2 mm. long and half as wide, obtusely trigonous, very shortly stipitate, minutely puncticulate, apiculate, yellowish brown.

This is closely related to *C. macrocephalus*, from which it may not be more than varietally distinct.

***Cyperus elegans* L. Sp. Pl. ed. 2. 68. 1762.**

Retalhuleu (in marsh, Champerico, at sea level); reported from Escuintla and Suchitepéquez, but perhaps incorrectly. Southern United States to Mexico, British Honduras, and Costa Rica; West Indies.

A glabrous perennial with very short rhizomes, the culms cespitose, 30-60 cm. tall, 1.5-2 mm. thick at the apex, sometimes roughened and septate-nodulose, somewhat trigonous, the whole plant more or less viscid; leaves about as long as the culms, 1-4 mm. wide, involute, septate-nodulose, coriaceous, scabrous on the margins, the sheaths brownish; bracts 3-5, very unequal, 5-40 cm. long, 1-4 mm. wide; rays of the umbel 3-8, very unequal, 12 cm. long or less, sometimes compound; spikelets capitate or flabellate-capitate, 3-20 in a cluster, oblong to linear, 3-15 mm. long, 2.5-3.5 mm. wide, 6-20-flowered, turgid; rachilla not winged; scales 2-3 mm. long, broadly ovate to rounded, imbricate, viscid, cuspidate-mucronate, 7-9-nerved, mostly reddish purple when young but fading to stramineous, the margins clasping the achene; achene trigonous-obovoid, 1.5 mm. long, evidently stipitate, apiculate, black and lustrous.

***Cyperus esculentus* L. Sp. Pl. 45. 1753.**

Zacapa, wet field near Zacapa, 200 meters; probably in other parts of Guatemala, but not collected. Southern Canada to Mexico and Panama; West Indies and South America; Old World tropics.

A glabrous perennial with long and very slender stolons, these terminating in globose or ovoid tubers; culms trigonous, 15-50 cm. tall, smooth; leaves numerous, about equaling the culms, 3-10 mm. wide, flat, smooth on the margins, the sheaths pale or reddish brown; bracts 2-6, longer or shorter than the inflorescence; rays of the umbel 5-10, simple or compound; spikelets distant in the spike, 5-24 in each spike, divaricate, linear, 6-30 mm. long, 1-3 mm. wide, when mature turgid and not compressed, 8-40-flowered; rachilla winged; scales 2.5-4 mm. long, pale brown, thin, 7-9-nerved, imbricate, slightly spreading at the apex, mucronulate; achene 1.5-2 mm. long, broadly oblong, trigonous, obtuse, not apiculate, light brown or grayish, lustrous, puncticulate.

The English name is "chufa," the plant being sometimes cultivated for its hard but rather sweet and agreeably flavored tubers, which are eaten raw. It is probably the tubers of this species which are offered for sale in the markets of Quezaltenango, Totonicapán,



and other places, under the name "sintule." The plant has not been noted in cultivation in Guatemala and the tubers are not common in the markets.

**Cyperus Fendlerianus** Boeckl. *Linnaea* 35: 520. 1868. *C. Schweinitzii* var. *debilis* Britton, Bull. Torrey Club 13: 208. 1886. *C. Fendlerianus* var. *debilis* Kuekenenthal, *Pflanzenreich* IV. 20: 465. 1936.

Reported by Kuekenenthal from Dept. Huehuetenango, *Seler* 2710. Southwestern United States and Mexico.

A glabrous perennial with short rhizomes, the slender culms 20–30 cm. tall, scaberulous above on the angles, bulbous-thickened at the base; leaves 3–4 to a culm, shorter than the culm or longer, 2–4 mm. wide, rough-margined; bracts 4–5, longer than the inflorescence, this contracted, 4–6-radiate, the rays usually short but rarely 6 cm. long, sometimes compound; spikes oblong-ovate, about 1 cm. long, containing numerous spikelets; spikelets suberect, oblong-lanceolate, acute, 4–7 mm. long, 2 mm. wide, subcompressed, 6–8-flowered, the rachilla not winged; scales laxly imbricate, finally patulous at the apex, persistent, articulate at the base, broadly ovate, grayish and purplish-striate or dirty stramineous, obscurely 9–11-nerved, bearing a short excurved mucro; achene four-fifths as long as the glume, triquetrous-ovoid, apiculate, densely punctulate.

The Guatemalan collection is referred by Kuekenenthal to var. *debilis*.

**Cyperus flavescens** L. Sp. Pl. 46. 1753.

Usually in sand of stream beds, sometimes in moist thickets, at 900 meters or less; Alta Verapaz; Zacapa; Jutiapa; Santa Rosa; Escuintla; Retalhuleu; probably in all the Pacific coast departments. United States to Mexico and Panama; West Indies; South America; Europe and Africa.

A glabrous annual with fibrous roots, the culms slender, cespitose, mostly 5–15 cm. tall, smooth; leaves few, shorter than the culms, about 1 mm. wide, flat, the sheaths purplish; bracts about 3, longer than the inflorescence; rays of the umbel few, simple, often very short or obsolete; spikelets 3–10 in each cluster, linear-oblong, subacute, 6–10 mm. long or even longer, 2 mm. wide, compressed, mostly 10–18-flowered, the rachilla not winged; scales densely imbricate, ovate, obtuse, yellowish or finally brownish, often mucronulate, 3-nerved; achene one-third to one-half as long as the glume, broadly obovate, biconvex, brown or fuscous-brown, somewhat lustrous, transversely zonate, contracted at the base, apiculate.

**Cyperus flavus** (Vahl) Nees, *Linnaea* 19: 698. 1847. *Mariscus flavus* Vahl, Enum. Pl. 2: 374. 1806. *Kyllinga cayennensis* Lam. Ill. 1: 149. 1791. *C. cayennensis* auct. *C. flavomariscus* var. *peduncularis* Britton, Bull. Torrey Club 13: 215. 1886. *C. flavus* var. *pe-*

*duncularis* Kuekenth. Pflanzenreich IV. 20: 532. 1936. *Sintule*; *Sacabasto*.

Moist or wet fields or thickets, sometimes a weed in cultivated ground, often in sand along streams, occasional in pine forest, growing on Volcán de Pacaya among rocks of the active cone and ascending there to 2400 meters, probably introduced by cattle, but in other parts of the country ascending to 2700 meters, and growing mostly at 1500 meters or more; Petén; Alta Verapaz; Zacapa; Jalapa; Jutiapa; Guatemala; reported from Sacatepéquez; Chimaltenango; Huehuetenango; San Marcos. Southern United States (where introduced) to Mexico, British Honduras, and Panama; West Indies; South America.

A glabrous perennial with short thick rhizomes, the culms rather stout, 30–100 cm. tall, 2–3 mm. thick at the apex, trigonous, sometimes roughened on the angles; leaves about 8 to a culm, shorter or longer than the culm, 2–6 mm. wide, thin and flat, scaberulous on the margins, the sheaths reddish purple; bracts 4–6, unequal, mostly longer than the inflorescence; rays of the umbel sometimes 5 cm. long but usually much shorter and often none, simple; spikes 1–2 cm. long, 5–10 mm. wide, oblong to ovate, very dense, with numerous spikelets; spikelets 1–2-flowered, 3–5 mm. long, 1 mm. wide, at least the upper ones ascending, elliptic, somewhat quadrangular, the rachilla winged; scales 2.5–3 mm. long, ovate-elliptic, 9-nerved, stramineous to brown, with hyaline margins; achene about 2 mm. long, trigonous-ellipsoid, dark brown, minutely punctulate.

Called “tule” in Oaxaca. In recent years this species has been treated under the name *Cyperus cayennensis* (Lam.) Britton, but this name was discarded by Kuekenthal because he considered the application of the name *Kyllinga cayennensis* uncertain. It would seem that the proper name for the species should be *C. incompletus* (Jacq.) Link, based upon *Kyllinga incompleta* Jacq., published in 1790, but this likewise he rejected. The leaves and culms of this and other species of *Cyperus* are used commonly in Guatemala for stuffing saddle pads used on pack animals.

***Cyperus globulosus*** Aubl. Pl. Guian. 47. 1775. *C. echinatus* Wood, Class-book 734. 1863.

Grassy slopes or in sand along streams, at 600 meters or less; reported from Petén; Zacapa; Chiquimula. Southeastern United States; Yucatan; Greater Antilles; northern South America.

A glabrous perennial with short rhizomes, the culms slender, more or less caespitose, 15–30 cm. tall, smooth, enlarged at the base; leaves mostly shorter than the culms, 1.5–4 mm. wide, flat, the sheaths purplish; bracts 5–8, much exceeding the inflorescence; rays of the umbel 6–12, simple, 5 cm. long or shorter, the spikes subglobose, 5–8 mm. in diameter, rather dense; spikelets numerous, divergent or the

lower ones reflexed, linear-lanceolate, acute, 4-6 mm. long, 1 mm. wide, 3-6-flowered, the rachilla winged; scales rather remote, oblong-elliptic, appressed, rufous or stramineous, 9-nerved; achene three-fifths as long as the glume, trigonous-oblong, apiculate.

This species is not reported from the Yucatan Peninsula by O'Neill, although collected at Sisal as long ago as 1865, and so reported by Kuekenenthal.

***Cyperus guatemalensis* Steud. Syn. Cyper. 47. 1855.**

Type said to have been collected in Guatemala, *Kegel 1270*, and reported also from Martinique. The collector is unknown to the writers in connection with Guatemala. Kuekenenthal lists the species as doubtful or not determinable.

***Cyperus haspan* L. Sp. Pl. 45. 1753. *C. juncooides* Lam. Ill. 1: 147. 1791. *C. haspan* subsp. *juncooides* Kuekenenth. Repert. Sp. Nov. 23: 184. 1926.**

Wet savannas, marshes, or bogs, sometimes along streams or in ditches, ascending from sea level to 1500 meters; Alta Verapaz; Izabal; Chiquimula; Jalapa; Jutiapa; Santa Rosa. Southern United States to Mexico, British Honduras, and Panama; West Indies; South America; Old World tropics.

Plants glabrous, annual or perennial, with short rhizomes or only fibrous roots, the culms subcespitose, 20-60 cm. tall, 2-3 mm. wide at the apex, compressed-trigonus to 3-winged, rather soft and weak; leaves reduced to a few purplish brown sheaths at the base of the culm, very rarely with blades; bracts 2, unequal, 1-5 cm. long; rays of the umbel very unequal, usually compound, the spikelets clustered at the ends of the raylets, linear, acute, 4-10 mm. long, 1 mm. wide, compressed, 6-30-flowered, the rachilla straight, not winged, the achenes and stamens persistent after the glumes have fallen; scales 1-1.5 mm. long, oblong-ovate, obtuse, sometimes minutely mucronulate, reddish, thin, 3-nerved; achene rounded-trigonus, 0.5 mm. long, subglobose, stipitate, verrucose, scarcely apiculate.

Kuekenenthal refers all American material to subsp. *juncooides*, but this is separated from Old World plants by doubtfully distinct characters.

***Cyperus hermaphroditus* (Jacq.) Standl. Contr. U. S. Nat. Herb. 18: 88. 1916. *Carex hermaphrodita* Jacq. Coll. Bot. 4: 174. 1790. *Mariscus Jacquini* HBK. Nov. Gen. & Sp. 1: 216. 1815. *Cyperus alpinus* Liebm. Vid. Selsk. Skrivt. V. 2: 215. 1851. *Coyolito*.**

Damp or wet thickets, fields, or forest, often in sand along streams or a weed in cultivated ground, ascending from sea level to about



2600 meters; Petén; Alta Verapaz; reported from Izabal; Zacapa; Chiquimula; Jalapa; Jutiapa; Santa Rosa; Escuintla; Sacatepéquez; Chimaltenango; Suchitepéquez; Sololá; Retalhuleu; Quezaltenango; San Marcos; Huehuetenango. Mexico and British Honduras to Panama; South America.

A glabrous perennial with short rhizomes, the culms 15–75 cm. tall, 1–2 mm. thick at the apex, trigonous, smooth, often tuberos-thickened at the base; leaves 3–9 to a culm, 3–7 mm. wide, flat, scaberulous on the margins, the sheaths purplish brown; bracts 5–8, unequal, 2–7 mm. wide; rays 12 or fewer, 12 cm. long or less, sometimes wanting, often branched, the spikes 1–3 cm. long, 1–1.5 cm. broad, dense or lax, usually cylindric; spikelets numerous, 5–10 mm. long, 1 mm. wide, oblong-lanceolate, somewhat tetragonous, usually divaricate, 3–7-flowered, the lowest sometimes reflexed, the rachilla winged; scales 2.5–3.5 mm. long, ovate-elliptic, appressed, thin, obtuse or submucronate, many-nerved, yellowish to golden brown; achene 1.2–1.8 mm. long, trigonous, oblong-ellipsoid, not stipitate, minutely apiculate.

**Cyperus humilis** Kunth, Enum. Pl. 2: 23. 1837. *C. humilis* var. *elatio*r Britton, Bull. Torrey Club 15: 99. 1888.

Wet thickets, marshes, or sandy river beds, ascending from near sea level to about 1450 meters; Petén; Alta Verapaz; Zacapa. Mexico and British Honduras; West Indies; Peru.

A glabrous annual with fibrous roots, the culms densely cespitose, 1–20 cm. tall, 1 mm. thick, smooth; leaves 1–2 to each culm, 20 cm. long or less, 1–2 mm. wide, roughened on the margins, the sheaths reddish brown; bracts 2–4, unequal, 15 cm. long or less; inflorescence a single globose head 3–18 mm. broad, very dense; spikelets numerous, oblong-lanceolate, 3–6 mm. long, 1.5–2 mm. wide, compressed, 8–18-flowered, the rachilla straight, not winged; scales about 1 mm. long, ovate, 3-nerved, short-mucronate, the keel green, the sides whitish, hyaline; achene 0.8 mm. long, trigonous-ovoid, acuminate, olive to chestnut-brown, transversely rugulose, substipitate.

**Cyperus imbricatus** Retz. Obs. Bot. 5: 12. 1789. *C. radiatus* Vahl, Enum. Pl. 2: 369. 1806. *C. radiatus* var. *elongatus* Boeckel. Linnaea 36: 319. 1870.

Shallow water at edge of lake, forming large colonies, Lago de Atescatempa, Jutiapa, 500 meters; reported from mouth of Río Polochic, Izabal. Mexico; Costa Rica; West Indies; South America; Old World tropics.

Plants perennial, robust, glabrous, with very short, ligneous rhizomes, the culms about a meter tall, trigonous, smooth, leafy at the base; leaves shorter than culms, coriaceous, 4–8 mm. wide, the sheaths fuscous; bracts 3–5, equaling or longer than the inflorescence; rays of the umbel 6–8, compound, the spikes corymbose-fasciculate, sessile or subsessile, cylindric, dense, 1–3 cm. long, 4–8 mm. wide; spikelets numerous, crowded, suberect, oblong-lanceolate or linear-lanceolate, 3–6

mm. long, about 1 mm. wide, subcompressed, 10–20-flowered, the rachilla narrowly winged; scales 1.2 mm. long, closely imbricate, broadly ovate, obtuse, membranaceous, pale ferruginous, 3–5-nerved, terminating in a short excurved mucro; achene half as long as the glume, ovoid or ellipsoid, compressed-trigonus, stramineous, lustrous, scarcely apiculate.

**Cyperus ischnos** Schlecht. Bot. Zeit. 7: 99. 1849. *Chan-sola* (Huehuetenango).

Grassy slopes in pine forest, 250–2100 meters; Petén; Zacapa; Chiquimula; Santa Rosa; Huehuetenango. Mexico and British Honduras; northern South America.

A slender perennial with short rhizomes, the culms separated, 20–75 cm. tall, 1 mm. thick at the apex, smooth, often tuberous-thickened at the base; leaves 2–4 to a culm, 10–40 cm. long, filiform, 1.5 mm. wide or less, rough-margined, the sheaths reddish brown; bracts 3–5 and 18 cm. long or less, filiform, the inflorescence consisting of 1–4 dense sessile heads 5–15 mm. broad, containing 5 to many spikelets; spikelets oblong-lanceolate, 5–9 mm. long, 2 mm. wide, compressed, acute, 4–12-flowered, the rachilla straight, narrowly winged; scales 2.2–2.8 mm. long, ovate or oblong-lanceolate, tridentate at the apex, 7–9-nerved, spreading when mature, the keel green, the sides white-hyaline to yellow; achene 1.2–1.5 mm. long, obovoid or oblong-ellipsoid, brown, puncticulate, not stipitate.

**Cyperus lanceolatus** Poir. in Lam. Encycl. 7: 245. 1806. *C. Humboldtianus* Schult. in Roem. & Schult. Syst. 2: Mant. 100. 1824. *C. Olfersianus* Kunth, Enum. Pl. 2: 10. 1837. *C. lanceolatus* var. *compositus* Presl, Reliq. Haenk. 1: 167. 1830. *Tule*.

Wet fields or thickets, often along streams or lake shores or in marshes or ditches, ascending from sea level to about 2000 meters; Alta Verapaz; Baja Verapaz; Chiquimula; Jalapa; Escuintla; Guatemala; Suchitupéquez; Sololá; Retalhuleu; Huehuetenango. Southern United States to Mexico and British Honduras; West Indies and South America.

A glabrous perennial with short rhizomes, the culms cespitose, 15–40 cm. tall, 1 mm. thick at the apex, trigonus, smooth; leaves 2–4 to a culm, shorter than the culm, 1–2 mm. wide, flat, scaberulous on the margins, the sheaths reddish brown; bracts 2–4, unequal, 2–8 cm. long, longer than the inflorescence; rays of the umbel 5 or fewer, often wanting, simple, bearing a cluster of 4–17 spikelets; spikelets lanceolate, 3–7 mm. long, 1.5–2 mm. wide, flat, 5–16-flowered, the rachilla straight or nearly so, not winged; scales 1.5 mm. long, broadly ovate, obtuse, 3-nerved, the keel green or brown, the sides hyaline; achene 1 mm. long, lenticular, obovate-ellipsoid, stipitate, the surface with hexagonal cells, reddish brown.

Much of the Guatemalan material is referable to var. *compositus* Presl, in which the clusters of spikelets are pedunculate rather than sessile as in the typical form.

**Cyperus lentiginosus** Millsp. & Chase, Field Mus. Bot. 3: 74. 1903. *C. tenuis* var. *lentiginosus* Kuekenh. Pflanzenreich IV. 20: 418. 1936.

Damp thickets or fields, brushy slopes, or in sand along streams, at 1850 meters or less; Chiquimula; Jutiapa; Santa Rosa; Escuintla, Guatemala; Chimaltenango; Suchitepéquez. Yucatan and British Honduras.

A glabrous perennial with short rhizomes, the culms stout, 25–75 cm. tall, 1.5 mm. thick at the apex, smooth; leaves 2–4 to a culm, flat, 2–6 mm. wide, rough-margined, the sheaths reddish purple; bracts 6–10 and 2–8 mm. wide, often much elongate; rays 6–16, simple or compound, the spikes 2–4 cm. long, 2–2.5 cm. broad, cylindric or oblong; spikelets distichous, linear-lanceolate, 10–13 mm. long, 1–1.5 mm. wide, subterete, divaricate or the lower somewhat reflexed, 4–6-flowered, the rachilla straight, winged; scales 4–5 mm. long, oblong-lanceolate, short-mucronate, 7–11-nerved, appressed or with somewhat spreading tips, clasping the achene, light brown spotted with dark purple; achene 2 mm. long, trigonous, obovoid-oblong, brown, punctate, not stipitate.

**Cyperus ligularis** L. Pl. Jam. Pugill. 3. 1759. *Tul coyohillo*.

Wet fields or banks, especially in salt flats near the seacoast, ascending to about 1170 meters (Lago de Amatitlán); Izabal; Chiquimula; Escuintla; Guatemala; Retalhuleu; San Marcos. Florida and Alabama and Mexico to British Honduras and Panama; West Indies; South America; Old World tropics.

A coarse stout perennial with short thick rhizomes, the culms stout and stiff, 30–90 cm. tall, trigonous, 2–5 mm. thick at the apex, papillose; leaves longer than the culm or shorter, 5–20 mm. wide, thick, septate-nodulose, papillose, very rough on the margins and costa, pale when dried, the sheaths reddish brown; bracts 5–12, unequal, 5–15 mm. wide; rays of the umbel 5–12, unequal, branched, usually short, the spikes 3–7 in a dense cluster, 1.5–2.5 cm. long, 10–12 mm. wide; spikelets very numerous, 2–6-flowered, turgid, subterete, 3–7 mm. long, 2–2.5 mm. wide, divaricate or the lower reflexed, the rachilla zigzag, winged; scales 2–2.5 mm. long, ovate, apiculate, 9–11-nerved, brown or stramineous with reddish brown striations, lustrous; achene 1.2–1.4 mm. long, trigonous, obovoid-ellipsoid, brown, apiculate, puncticulate, substipitate.

This isolated species grows most often in brackish soil, but not invariably so. In British Honduras it receives the name of “cutting-grass.”

**Cyperus Lundellii** O'Neill, Carnegie Inst. Wash. Publ. 522: 276. f. 2. 1940.

Petén, the type from river bank, Subín River, Monte Santa Teresa, *Lundell* 2657; collected also at El Paso, *Lundell* 1475.



A glabrous perennial with short rhizomes, the culms 60–100 cm. tall, 2 mm. thick at the apex, triquetrous, scaberulous on the angles, obscurely septate-nodulose; leaves 3–6 to a culm, 20–90 cm. long, 3–6 mm. wide, flat, rough-margined; bracts 3–4 and 45 cm. long or less, 2–5 mm. wide; rays of the umbel 5–8, compound, the spikelets in clusters of 3–6 at the ends of the raylets; spikelets linear, acute, 6–13 mm. long, 2 mm. wide, turgid, 12–32-flowered, the rachilla straight, not winged; scales about 2 mm. long, suborbicular, acute and mucronulate, spreading, membranous, obsoletely 3-nerved, stramineous; achene 1 mm. long, trigonous, ovoid, black at maturity, acute, short-stipitate, conspicuously verrucose.

**Cyperus Luzulae** (L.) Retz. Obs. Bot. 4: 11. 1786. *Scirpus Luzulae* L. Sp. Pl. ed. 2. 75. 1762. *C. guatemalensis* Gandoger, Bull. Soc. Bot. France 66: 297. 1919 (type from Alta Verapaz, collected by Tuerckheim, probably at Cubilgüitz). *Cebollín*; *Cebolla de río*; *Sivac* (Cobán); *Suchipaite* (Huehuetenango).

Marshes and swamps, wet fields, or along streams, ranging from sea level to about 1400 meters, most common at low elevations; Petén; Alta Verapaz; Izabal; Retalhuleu; Suchitepéquez; Huehuetenango; Quezaltenango; San Marcos. Mexico and British Honduras to Panama; West Indies; South America.

A glabrous perennial with short rhizomes, the culms usually cespitose, stout, 20–50 cm. tall, obtusely trigonous; leaves 5–12 to a culm, 10–40 cm. long, 3–8 mm. wide, flat, rough-margined, the sheaths reddish brown; bracts 7–11, the rays of the umbel 6–12, the few spikes at the ends forming dense ovoid heads 6–15 mm. broad; spikelets ovate to oblong-ovate, 2.5–4 mm. long, 2 mm. wide, compressed, 6–16-flowered, the rachilla not winged; scales 1.2–1.5 mm. long, ovate or oblong-ovate, incurved, submucronate, obsoletely 3-nerved, white or yellowish; achene 1 mm. long, trigonous, linear-oblong, acuminate, scarcely stipitate, minutely punctulate, subapiculate.

A weedy plant, common in many localities. The stems are much used as a substitute for twine. A decoction of the root is drunk in Huehuetenango with *atol de maíz*, often flavored with toasted seeds of *sapote*.

**Cyperus macrocephalus** Liebm. Vid. Selsk. Skrivt. V. 2: 221. 1851. *C. oxycarioides* Britton, Bull. Torrey Club 11: 86. 1884.

Petén. Texas to Mexico and British Honduras.

A perennial with short rhizomes, the stout culms more or less cespitose, 20–60 cm. tall, 1–2 mm. thick at the apex, trigonous, smooth; leaves 2–3 to a culm, 15–40 cm. long, 2–7 mm. wide, subcoriaceous, flat, rough-margined, the sheaths reddish brown; bracts 4–7, unequal, 4–10 cm. long; inflorescence densely congested and forming a solitary globose head 1–4 cm. in diameter; spikelets numerous, oblong to linear-lanceolate, 5–12 mm. long, 1 mm. wide, 4–12-flowered, the rachilla disarticulating into 1-fruited joints, winged; scales 2 mm. long, ovate, sometimes mucronu-

late, obscurely 7–9-nerved, clasping the achene, stramineous to reddish brown, the margins white-hyaline; achene ellipsoid, obtusely trigonous, 1.2 mm. long, minutely puncticulate, short-stipitate, apiculate.

The collection of *J. D. Smith* 1850 reported from mouth of Río Polochic, Izabal, is to be referred to *C. Eggersii*.

***Cyperus manimae*** HBK. Nov. Gen. & Sp. 1: 209. 1815. *C. asperimus* Liebm. Vid. Selsk. Skrivt. V. 2: 218. 1851. *C. divergens* HBK. op. cit. 208. *C. manimae* var. *asperimus* Kuekenh. Pflanzenreich IV. 20: 463. 1936. *Chul, Chan-solá* (Huehuetenango).

Damp meadows or brushy slopes, sometimes in pine forest, often a weed in gardens or cornfields, 800–1900 meters; reported from Petén, probably in error; Escuintla; Chimaltenango; Sacatepéquez; reported from Santa Rosa; Huehuetenango; Quezaltenango. South-western United States to Mexico and Costa Rica; mountains of South America.

A perennial with short rhizomes, the culms 15–60 cm. tall, rather stout, smooth, leafy below; leaves shorter than the culms, 3–4 mm. wide, often scabrous, the sheaths brownish; bracts 5–8, longer than the inflorescence, this 3–6-radiate or contracted and almost head-like; the rays simple, the spikes ovate, 1.5–2 cm. long, dense; spikelets divergent, linear-lanceolate, acute, 5–6 mm. long, 1.5–2 mm. wide, 6–10-flowered, the rachilla very narrowly winged; scales rather remote, ovate, rounded and short-mucronate at the apex, fulvous, 7–11-nerved, with white hyaline margins; achene three-fourths as long as the scale, trigonous, obovoid-oblong, apiculate, brown or castaneous, lustrous.

Var. *asperimus*, distinguished by having somewhat scabrous culms, is represented by Guatemalan material.

***Cyperus Mutisii*** (HBK.) Griseb. Fl. Brit. W. Ind. 567. 1864. *Mariscus Mutisii* HBK. Nov. Gen. & Sp. 1: 216. 1815. *C. martinicensis* Boeckl. Cyp. Nov. 2: 38. 1890. *C. Mutisii* var. *martinicensis* Kuekenh. Pflanzenreich IV. 20: 485. 1936. *C. Mutisii* var. *contractus* Kuekenh. op. cit. 486. *Pegapecta* (Chimaltenango); *Coyolillo*.

Moist or wet fields or thickets, frequently in cultivated ground, often in sand along streams, ascending from about 200 meters to 1900 meters, most frequent at middle or rather high elevations; Alta Verapaz; Zacapa; Chiquimula; Jutiapa; Santa Rosa; Guatemala; Sacatepéquez; Chimaltenango; Quiché; Huehuetenango. Mexico to British Honduras and Panama; West Indies and South America.

A glabrous perennial with short ligneous rhizomes, the culms slender or rather stout, 30–100 cm. tall, 2–3 mm. thick at the apex, trigonous, usually smooth; leaves 2–3 to a culm, 2–12 mm. wide, flat, rough-margined, the sheaths reddish brown; bracts 5–8, the rays of the umbel 7–10 (rarely none, in var. *contractus*), with 1–6

digitate spikes at the apex; terminal spikes 2–4.5 cm. long, 5–10 mm. wide, oblong-cylindric, the lateral ones shorter; spikelets ellipsoid, 3–5 mm. long, 1–2 mm. wide, divergent or reflexed, 1–5-flowered, the rachilla zigzag, winged; scales 2.2–3.2 mm. long, ovate or elliptic, obtuse, 9–13-nerved, sometimes mucronulate, yellow to reddish or brown; achene 1.5–1.8 mm. long, broadly ellipsoid, brown, not stipitate, minutely apiculate, raised-punctulate.

This and the related species of subgenus *Mariscus* are rather poorly defined, and often it is difficult to decide to which supposed species a particular specimen should be referred. The group will require much additional study before the related plants can be classified satisfactorily, if a satisfactory disposition of them ever is possible. Kuekenenthal refers *Heyde & Lux 3542* from Dept. Santa Rosa to *Cyperus subambiguus* Kuekenenth. (Pflanzenreich IV. 20: 527. 1936; *Mariscus ambiguus* Liebm. Vid. Selsk. Skrivt. V. 2: 231. 1851, not *Cyperus ambiguus* Liebm.). We have not seen the specimen thus reported, but *C. subambiguus* appears to be too close to *C. Mutisii*, and the definite characters by which it is to be separated are not obvious from Kuekenenthal's account of the group.

***Cyperus niger*** Ruiz & Pavón, Fl. Peruv. 1: 47. 1798. *C. melanostachyus* HBK. Nov. Gen. & Sp. 1: 207. 1815. *Coyolillo*; *Juquillo*.

Marshes, wet fields or banks, along ditches, or often on sandbars along streams, 800–2500 meters; Alta Verapaz; Jalapa; Jutiapa; Guatemala; Sacatepéquez; Chimaltenango; Quiché; Huehuetenango; Quezaltenango; San Marcos. Texas and New Mexico. Mexico to Panama, Peru, and Argentina.

A small glabrous perennial with slender rhizomes, the culms usually cespitose, sometimes decumbent and rooting at the base, 10–30 cm. tall, smooth, with a few leaves at the base; leaves shorter than the culms, 1.5–2 mm. wide, the long sheaths brown; bracts 3, usually much longer than the inflorescence, this contracted and often head-like, 1–2 cm. broad, the rays 1–4 or none, bearing at the apex 3–6 spikes; spikelets crowded, spreading, oblong or linear-lanceolate, acute, 4–8 mm. long, 2 mm. wide, compressed, 8–16-flowered, the rachilla straight, not winged; scales densely imbricate, ovate-obtuse, dark red or dark castaneous, lustrous, 3–5-nerved; achene two-thirds as long as the glume, elliptic-ovate, compressed-biconvex, brown and lustrous, finely striate, densely punctulate, apiculate.

Kuekenenthal and O'Neill recognize several varieties of the species. *Cyperus niger* var. *capitatus* (*C. niger* var. *castaneus*) differs from the species and the other varieties in the castaneous color of the scales and the conspicuously apiculate achenes which are almost as long as the scales. The species is usually easily distinguished from other species by its low stature and very dark spikelets.



**Cyperus ochraceus** Vahl, Enum. Pl. 2: 325. 1806. *Tule*.

Bogs or wet meadows or thickets, ascending to 1900 meters; Petén; Zacapa; Chiquimula; Jalapa; Huehuetenango. Florida and Texas to Mexico, British Honduras, and Honduras; West Indies South America.

A glabrous perennial with short thick rhizomes, the culms 20–75 cm. tall, 1–2 mm. thick at the apex, trigonous, smooth; leaves 6–12 to a culm, about equaling the culms, 2–6 mm. wide, minutely scaberulous on the margins, the sheaths purplish brown; bracts 5–8, very unequal, the rays of the umbel 6–12, short or elongate, often compound; spikelets oblong-lanceolate or linear, 5–20 mm. long, 2–3 mm. wide, 16–30-flowered, forming globose heads, the rachilla straight, not winged; scales 1.5–2 mm. long, broadly ovate, not imbricate at maturity, cellular-reticulate, 3-nerved, falcate, stramineous to bright yellow or pale brown; achene ellipsoid to oval, 1.5 mm. long, conspicuously stipitate and acuminate-apiculate, purplish brown, white-reticulate.

The Maya name reported from Yucatan is “mazcabzuuc.”

**Cyperus odoratus** L. Sp. Pl. 46. 1753. *C. ferax* L. Rich. Act. Soc. Hist. Nat. Paris 1: 106. 1792. *C. Haenkei* Presl, Reliq. Haenk. 1: 172. 1830. *Navajuela*; *Saichó* (Cobán, Kekchí).

Usually in wet soil, thickets or waste ground, often along streams or ditches, marshes and wet fields, most common at low elevations, but ascending to about 1500 meters; Alta Verapaz; Izabal; Zacapa; Jutiapa; Santa Rosa; Escuintla; Guatemala; Retalhuleu; Quezaltenango. United States to Mexico, British Honduras, and Panama; West Indies; South America; Old World tropics.

A glabrous perennial with short rhizomes, the culms stout, 30–100 cm. tall, 3–5 mm. thick at the apex, smooth; leaves 3–5 to a culm, 10–60 cm. long, 4–12 mm. wide, subcoriaceous and rather rigid, scaberulous on the margins, the sheaths stramineous or brown; bracts 6–8, elongate; rays of the umbel 6–12, short or elongate, compound, the spikes 2–3 cm. long and 1–2.5 cm. wide; spikelets mostly rather distant and lax, divergent or reflexed, linear, 5–15 mm. long, 1 mm. wide, subterete, 3–15-flowered, the rachilla readily breaking up into 1-fruited joints, winged; scales 2–3.5 mm. long, broadly ovate to ovate-elliptic, closely imbricate, appressed and enclosing the achenes, brownish or reddish-stramineous, obsoletely 7–9-nerved; achene 1–1.5 mm. long, oblong or obovoid-oblong and trigonous, brown to black, substipitate, apiculate, minutely puncticulate.

Called “coyolillo” in El Salvador and probably also in Guatemala, the name alluding to a fanciful resemblance of the plant to a diminutive coyol palm (*Acrocomia*). This is a weedy plant and probably the most abundant *Cyperus* species of Central America.

**Cyperus oxylepis** Nees, Linnaea 9: 285. 1835, nomen; Steud. Syn. Cyper. 25. 1855.

In marshes, on sand, or in salt meadows of the Pacific seashore; Retalhuleu (Champerico); San Marcos (Ocós). West Indies and South America.

A glabrous perennial with short ligneous rhizomes, the culms cespitose, 15–30 cm. tall or more, obscurely trigonous, glutinous as also the leaves; leaves few, about equaling the culms, narrow, coriaceous, obsoletely septate-nodulose, rough-margined, involute, the sheaths stramineous, or purplish at the base; bracts 3, foliaceous, much exceeding the inflorescence; rays 3–6, simple or compound, unequal, 15 cm. long or less, the spikelets several, forming a hemispheric head 1.5–2 cm. in diameter; spikelets linear-lanceolate, acute, 10–20 mm. long, 3 mm. wide, subcompressed, 12–20-flowered, the slender rachilla not winged; scales rather remote, chartaceous, oblong-elliptic, patulous at the apex, the keel bright green, excurrent as an excurved mucro, the sides yellowish or brown, lustrous; achene three-fourths as long as the glume, oblong, attenuate at each end, trigonous, black at maturity, apiculate, white-punctulate.

**Cyperus pallens** (Liebm.) Standl. & Steyerm., comb. nov.  
*Mariscus pallens* Liebm. Vid. Selsk. Skrivt. V. 2: 230. 1851. *M. Haenkei* Presl, Reliq. Haenk. 1: 181. 1830, not *Cyperus Haenkei* Presl. *C. regiomontanus* Britton, Contr. U. S. Nat. Herb. 1: 362. 1895. *C. Pittieri* Boeckel. Allgem. Bot. Zeit. 2: 19. 1896. *C. regiomontanus* var. *pallens* (Liebm.) Kuekenth. Pflanzenreich IV. 20: 527. 1936. *C. regiomontanus* var. *Pittieri* (Boeck.) Kuekenth. loc. cit.

Reported by Kuekenthal from Huehuetenango, Jacaltenango, Selser 2860. California and western Mexico; British Honduras; Costa Rica; Venezuela; Peru.

A perennial with short rhizomes, the culms cespitose, slender, 10–30 cm. tall, acutely angulate, smooth, thickened at the base; leaves equaling the culms, 1.5–2 mm. wide, flat, the sheaths dark purplish; bracts 3–5, much exceeding the inflorescence, the rays of the umbel 3–5, simple, very short, the spikes ovoid or oblong-cylindric, 8–14 mm. long, 6–8 mm. wide, dense; spikelets divaricate, linear-oblong, 2.5 mm. long, 1–2-flowered, the rachilla winged; scales oblong-elliptic, subobtusate, the keel green, the sides pale ferruginous, 9-nerved; achene three-fourths as long as the scale, trigonous, slightly curved, apiculate.

The single British Honduras collection cited by Kuekenthal is referred by O'Neill to *C. flavus*. The proper disposition of *C. pallens*—of which we have seen no Guatemalan material—is decidedly uncertain, and it may not be a distinct species. Kuekenthal uses for it the name *C. regiomontanus*, under which *C. pallens* is treated as a variety, a course in violation of current rules of nomenclature.

**Cyperus panamensis** (Clarke) Britton ex Standl. Journ. Wash. Acad. Sci. 15: 457. 1925. *Mariscus panamensis* Clarke, Kew Bull. Add. Ser. 8: 15. 1908.

Wet open ground, 200–300 meters, Escuintla; Zacapa. Panama; Ecuador and Peru.

Plants annual, the culms cespitose, 20–30 cm. tall, triquetrous, rather stout, smooth, leafy below; leaves shorter than the culms, 3–5 mm. wide, flat, the sheaths dark brown at the base; bracts 4–5, longer than the inflorescence; rays of the umbel 3–8, simple, 5 cm. long or less, the spikes ovate-cylindric or broadly ovate, 2 cm. broad; spikelets numerous and usually dense, linear-oblong, acute, 7–10 mm. long, 1.5 mm. wide, obsoletely quadrangular, 3–8-flowered, spreading or divergent, the rachilla broadly winged; scales rather remote, oblong-elliptic, obtuse, the costa excurrent as a long mucro, the sides fulvous, 7–9-nerved; achene two-thirds as long as the glume, broadly oblong, slightly curved, trigonous, blackish, densely punctulate, short-apiculate.

Called "coyolillo" in El Salvador.

**Cyperus piceus** Liebm. Vid. Selsk. Skrivt. V. 2: 200. 1851.

Reported by Kuekenenthal from vicinity of Cobán, Alta Verapaz, 1350 meters, *Tuerckheim* 1933. Southern Mexico to Panama; South America.

A glabrous annual, the culms cespitose, slender, 10–30 cm. tall, smooth, sparsely leafy below; leaves shorter than the culms, very narrow, flat, the sheaths purplish; bracts 2–3, usually longer than the inflorescence; rays of the umbel 3–4, simple, the rays 4 cm. long or less, with 3–6 clustered spikelets at the tips; spikelets linear-oblong, 6–12 mm. long, 2 mm. wide, compressed, 10–20-flowered, the rachilla straight; scales rather densely imbricate, ovate, obtuse, castaneous, the margins white-hyaline, 3-costate; achene half as long as the glume, broadly obovate, biconvex, scarcely 1 mm. long, blackish, lustrous, transversely zonate, short-stipitate, apiculate.

**Cyperus polystachyos** Rottb. Desc. & Icon. 39. 1773. *C. odoratus* Auct., not L. *C. paniculatus* Rottb. op. cit. 40. *C. fugax* Liebm. Vid. Selsk. Skrivt. V. 2: 196. 1851.

Wet or moist fields or plains, 200 meters or less; Izabal; Zacapa; reported from Santa Rosa at 900 meters. Mexico to British Honduras and Panama; West Indies; South America; Old World tropics.

Perennial, with short rhizomes, the culms 20–50 cm. tall, slender, 1 mm. thick at the apex, smooth; leaves 2–5 to a culm, shorter than the culms, 2–4 mm. wide, coriaceous, rough-margined, the sheaths reddish brown; bracts 3–6, unequal, longer than the inflorescence; rays of the umbel 4–6, compound, unequal, 4 cm. long or less; spikelets 7–10 mm. long, 1.5 mm. wide, compressed, ascending, 13–40-flowered, the rachilla zigzag, winged; scales 1.5 mm. long, oval, obtuse, 3-nerved, stramineous, with hyaline margins; achene 1 mm. long, lenticular, obovate-oblong, the surface with hexagonal cells, short-stipitate, short-apiculate, brown to black, densely punctulate.



Called "pelillo" in El Salvador. Kuekenenthal recognizes several varieties and forms of the species, but they seem scarcely worth nomenclatural recognition.

**Cyperus prolixus** HBK. Nov. Gen. & Sp. 1: 206. 1816.

Marshes and open swamps, ranging from sea level to about 1500 meters; Alta Verapaz; Izabal; Guatemala; reported by Hemsley from San Gerónimo and Volcán de Fuego; collected by Godman and Salvin. Southern Mexico; Costa Rica and Panama; South America.

Plants perennial, large and coarse, with thick rhizomes, the culms commonly 1-1.5 meters tall, obtusely trigonous, spongy-thickened at the base, leafy below; leaves equaling or longer than the culms, 8-20 mm. wide, flat, septate-nodulose, rough-margined; bracts 6-10, longer than the inflorescence; umbels decomposed or even thrice branched, lax, large, with numerous rays, these as much as 30 cm. long; spikes rather dense, with numerous spikelets, oblong-elliptic; spikelets suberect, linear or linear-lanceolate, 15-20 mm. long, 1.5-2 mm. wide, acute, compressed, 10-14-flowered, the very slender rachilla flexuous, winged; scales rather remote, patulous at the apex in fruit, oblong-elliptic, obtuse, 4 mm. long, often short-mucronate, dirty-stramineous, 5-7-flowered, ferruginous-lineolate between the nerves; achene one-half to three-fifths as long as the glume, trigonous, narrowly oblong, dark brown, lustrous, densely punctulate, short-apiculate.

The plant is abundant in many places in the lowlands of Izabal, where it forms almost pure stands of considerable extent. In general appearance it is much like the papyrus of the Nile.

**Cyperus pseudovegetus** Steud. Syn. Cyp. 24. 1855. *C. pseudovegetus* var. *megalanthus* Kuekenenth. Pflanzenreich IV. 20: 176. 1936 (type from Cubilgüitz, Alta Verapaz, 350 meters, *Tuerckheim* 975).

Stream banks, Petén and Alta Verapaz; no Guatemalan specimens have been seen by the writers. United States and Mexico.

A glabrous perennial with short ligneous rhizomes, the culms 40-75 cm. tall, trigonous, smooth, leafy below; leaves equaling the culms, 2-10 mm. wide, flat, scarcely septate-nodulose; bracts 4-6, very long, the rays of the umbel about 8, simple or compound, 6 cm. long or less, usually bearing 3-6 subglobose heads of spikelets more or less contracted into a single head; spikelets numerous, ovate, densely congested into a dense lobate head, 4-7 mm. long, 3-4 mm. wide, 10-20-flowered, the rachilla not winged; scales densely imbricate, finally patulous at the apex, oblong-lanceolate, ferruginous to greenish, the costa excurrent as a conspicuous excurved mucro; achene 1.2-1.8 mm. long, obscurely trigonous, linear, purplish brown, conspicuously stipitate, apiculate, minutely puncticulate.

This species is very closely related to *C. surinamensis*. The Guatemalan collections are referable to var. *megalanthus*, distinguished by having wider leaves and somewhat larger heads of spikelets than the typical form.

**Cyperus rivularis** Kunth, Enum. Pl. 2: 6. 1837. *C. lagunetto* Steud. Syn. Cyp. 5. 1855. *C. rivularis* subsp. *lagunetto* Kueken-th. Pflanzenreich IV. 20: 373. 1936. *C. rivularis* var. *lagunetto* (Steud.) O'Neill, Rh. 44: 86. 1942.

Sandy stream banks, 850–1400 meters; Jutiapa; Alta Verapaz; Huehuetenango. United States and Mexico; Honduras; Costa Rica; South America.

A glabrous annual with fibrous roots, the culms cespitose, slender, 5–60 cm. tall, smooth, leafy at the base; leaves mostly longer than the culms, setaceous, soft and weak, the sheaths brown; bracts 3–4, most of them longer than the inflorescence; rays of the umbel 2–5, simple, 2 cm. long or less, bearing at the apex a cluster of 4–8 spikelets; spikelets rather densely subspicate, divergent, oblong, 6–12 mm. long, 2–2.5 mm. wide, obtuse, compressed, 10–24-flowered, the rachilla straight, not winged; scales densely imbricate, oblong-ovate, obtuse, fuscous or variegated with chestnut, lustrous, green-carinate, 3-nerved; achene half as long as the glume, obovate, compressed-biconvex, almost black, lustrous, short-apiculate.

The Guatemalan and all tropical American material is referred by Kueken-thal to subsp. *lagunetto*, which he separates upon the basis of often taller culms, flat and broader leaves, and laxly spicate leaflets, but O'Neill has reduced the subspecific rank to varietal category, separating the variety *lagunetto* on the basis of differently shaped achenes and sometimes 3 stamens.

**Cyperus rotundus** L. Sp. Pl. 45. 1753. *Coyolillo*. Figure 25.

Wet fields or along streams, sometimes in lawns or pastures, chiefly at low elevations but ascending to possibly 1500 meters; Izabal; Zacapa; Guatemala. United States and Mexico to British Honduras and Panama; West Indies; South America; Old World tropics.

A low perennial with long stolons ending in small tubers, the culms slender, 15–50 cm. tall, 1–1.5 mm. thick at the apex, triquetrous, smooth; leaves 5–12 to a culm, about equaling the culms, flat, 3–6 mm. wide, smooth on the margins, the sheaths reddish brown; bracts 2–4, longer or shorter than the inflorescence; rays of the umbel 3–8, usually simple, sometimes compound, 9 cm. long or less; spikelets 2–12 in each spike, lax, linear, compressed, 4–40 mm. long, 1–2.5 mm. wide, 12–36-flowered, the rachilla winged; scales imbricate, ovate, obtuse, thin, 3–3.5 mm. long, reddish brown, the keel green, 7-nerved, scarcely mucronate; achene 1.5–2 mm. long, obovoid or ellipsoid, black and shining, scarcely apiculate, minutely punctulate.

On the North Coast this species is often a weed in flower beds, gardens, and other cultivated ground.



FIG. 25. *Cyperus rotundus*. a, Spikelet ( $\times 5$ ). b, Habit ( $\times \frac{1}{2}$ ).



**Cyperus semiochraceus** Boeckel. Flora 61: 29. 1878. *C. Bourgaei* Clarke ex Lundell, Carnegie Inst. Wash. Publ. 436: 287. 1934, nomen nudum.

Petén (Uaxactún). Southern Mexico to British Honduras.

A stout coarse perennial with short thick ligneous rhizomes, the culms 1–1.5 meters tall, 8 mm. thick at the apex, obtusely trigonous, smooth; leaves coriaceous, shorter than the culms, 1.5–2 cm. wide, serrulate on the margins, the sheaths reddish purple; bracts 5–12, much exceeding the inflorescence; rays 7–12, compound, 50 cm. long or less, the spikes partly sessile and partly pedunculate, fasciculate, long-cylindric, 2–6 cm. long, 1–2 cm. thick, dense; spikelets divaricate or ascending, linear-oblong or linear, 3–15 mm. long, 1 mm. wide, subcompressed, 8–10-flowered, the rachilla winged; scales closely imbricate, 1.3–1.8 mm. long, lustrous, ovate or obovate, sometimes mucronulate, obscurely nerved, brown, with yellow-hyaline margins; achene 0.8 mm. long, compressed-trigonous, oval or ovoid, short-stipitate, scarcely apiculate, pale brown.

Called “zacate cortador” in Campeche.

**Cyperus seslerioides** HBK. Nov. Gen. & Sp. 1: 209. 1815.

Reported by Kuekenenthal from Quezaltenango, *Bernoulli & Cario 1003*; Jalapa; reported from Santa Rosa; Huehuetenango. Mexico; Venezuela.

A low perennial with short rhizomes, the culms cespitose, slender, 5–16 cm. tall, obscurely trigonous, smooth, bulbous-thickened at the base; leaves few, about equaling the culms or shorter, very narrow, complicate, rather stiff, the sheaths brown; bracts 3, longer than the inflorescence, reflexed, the inflorescence contracted into a single subglobose head 1 cm. or less in diameter; spikelets numerous, oblong-lanceolate, subobtuse, compressed, 3–4 mm. long, 2–2.5 mm. wide, 10–12-flowered, the rachilla straight, not winged; scales closely imbricate, membranaceous, finally patulous at the apex, lance-ovate, 1.5 mm. long, pale stramineous or fulvous, 3-nerved, acuminate and terminating in an excurved mucro; achene one-third as long as the glume, rounded-ovate, trigonous, obtuse, dark brown, densely punctulate.

**Cyperus simplex** HBK. Nov. Gen. & Sp. 1: 207. 1816.

Wet thickets or forest, 1150 meters or less; Izabal (Quiriguá); Huehuetenango. Southern Mexico; Costa Rica; widely dispersed in South America.

A slender perennial with short rhizomes, the culms few, cespitose, 4–15 cm. tall, smooth, leafy below; leaves much longer than the culms, 3–6 mm. wide, flat, thin, the sheaths purplish; bracts 4–10, equaling or longer than the rays; umbel simple, the rays 5–10, very unequal, 5–20 cm. long, bearing apical clusters of usually 1–3 digitate spikelets; spikelets linear-oblong, acutish, 6–16 mm. long, 2 mm. wide, subcompressed, 12–36-flowered, the rachilla flexuous, not winged; scales lax, patulous at the apex, membranaceous, ovate, incurved, articulate at

the base, scabrous-carinate, obscurely 5-7-nerved, pale brownish, sometimes red-lineolate; achene two-fifths as long as the glume, obovoid, trigonous, truncate at the apex and apiculate, pale rufous, densely white-punctulate, lustrous.

In general appearance similar to *C. diffusus*, but easily recognized by the very short culms and the much longer rays of the umbel. Apparently rare in Guatemala, as in other parts of Central America.

**Cyperus surinamensis** Rottb. Descr. & Icon. 35. 1773. *C. surinamensis* var. *lutescens* Boeckl. Linnaea 35: 555. 1868. *Coyolillo*.

Wet fields and thickets, swamps, stream and lake margins, often in sand flats along streams, chiefly at less than 1000 meters, rarely ascending to 1800 meters; Izabal; Zacapa; Chiquimula; Jalapa; Jutiapa; Santa Rosa; Escuintla; Guatemala; reported from Sacatepéquez; Chimaltenango; Huehuetenango; San Marcos. Florida to Texas, Mexico, British Honduras, and Panama; West Indies; South America.

A glabrous perennial with short thick rhizomes, the culms stout, 10-60 cm. tall, 1 mm. thick at the apex, trigonous, downwardly scabrous on the angles; leaves 2-6 to a culm, about equaling the culms, 1-3 mm. wide, flat or conduplicate, bright green, rough-margined, the sheaths purplish or brownish; bracts 5-7, very unequal, the rays of the umbel 5-7 and 7 cm. long or less, sometimes compound; spikelets congested in dense heads, numerous, oblong or linear, 3-14 mm. long, 2 mm. wide, strongly compressed, the rachilla not winged; scales 1-1.5 mm. long, ovate, acute or minutely apiculate, cellular-reticulate, stramineous, 3-nerved; achene 0.6 mm. long, narrowly ovoid-oblong, obtusely trigonous, faintly transverse-rugulose, minutely punctulate, short-apiculate, reddish brown.

**Cyperus tenerrimus** Presl, Reliq. Haenk. 1: 166. 1828.

Grassy banks or fields, wet sand along streams, 200-1600 meters; Zacapa; Jutiapa; Suchitepéquez; Santa Rosa; Escuintla; Guatemala; Quiché; Huehuetenango. Mexico to Costa Rica; Colombia.

A low perennial with very short rhizomes, the culms very slender, cespitose, 5-15 cm. tall, smooth, thickened at the base; leaves shorter or longer than the culms, 1 mm. wide, the sheaths brown; bracts 6-8, very long and spreading, finally reflexed; inflorescence consisting of a single dense head 5-15 mm. in diameter; spikelets numerous, elliptic or ovate, 3-5 mm. long, 2 mm. wide, compressed, 6-16-flowered, acutish, the rachilla straight, not winged; glumes densely imbricate, finally patulous at the apex, incurved, oblong-elliptic, navicular and carinate, truncate-retuse at the apex, dirty white, 5-nerved; achene two-thirds as long as the glume, narrowly oblong, trigonous, apiculate, blackish, punctulate.

Called "pelillo" in El Salvador and "tule" in Oaxaca.

**Cyperus tenuis** Swartz, Prodr. Veg. Ind. Occ. 20. 1788. *C. caracasanus* Kunth, Enum. Pl. 2: 86. 1837. *Zumbidor* (Santa Rosa).

Wet or damp fields or thickets, often on sand or gravel bars, 1400 meters or less, chiefly at low elevations; Petén; Alta Verapaz; Izabal; Zacapa; Santa Rosa; Escuintla; Suchitepéquez; Quezaltenango; San Marcos. Mexico and British Honduras to Panama; West Indies; South America; west Africa.

A glabrous perennial with short rhizomes, the culms cespitose, 10–50 cm. tall, 1–1.5 mm. thick at the apex, trigonous, smooth; leaves 3–5 to a culm, 5–30 cm. long, 2–3 mm. wide, flat, rough-margined, the sheaths reddish purple; bracts 5–9, longer than the inflorescence; rays of the umbel 5–12, simple, 9 cm. long or less, the spikes 1.5–2 cm. long, 1–2.5 cm. wide; spikelets rather dense or remote, linear, 5–15 mm. long, 3–8-flowered, the rachilla winged; scales 3–3.5 mm. long, oblong-elliptic, obtuse, mucronulate, closely appressed, 7–11-nerved, greenish white to brown, with hyaline margins; achene 1.5–2 mm. long, trigonous, oblong-ellipsoid, brown, somewhat falcate, substipitate, scarcely apiculate, punctate, dull.

Called “coyolillo” in El Salvador.

**Cyperus uncinulatus** Schrad. ex Nees in Mart. Fl. Bras. 2, pt. 1: 23. 1842.

Moist or dry, open or brushy plains and hillsides, about 200 meters; Zacapa (collected several times in the vicinity of Zacapa). Southern and western South America.

Plants with short rhizomes, the culms very slender, 5–12 cm. high, compressed-trigonous, smooth, bulbous-thickened at the base; leaves often equaling or longer than the culms, scarcely 1 mm. wide; bracts 3–4, much longer than the inflorescence, spreading or reflexed; inflorescence capitate, subglobose, 5–10 mm. in diameter, very dense, with 7 or much more numerous spikelets; spikelets oblong, 4–6 mm. long, 2–2.5 mm. wide, compressed, 10–20-flowered, the rachilla not winged; scales dense, strongly outcurved above, oblong-ovate, ferruginous or sordid-stramineous, cuspidate with a long excurved mucro; stamen 1; achene obovate-oblong or obovate, trigonous, rufous, densely punctulate, short-apiculate; style short, 3-fid.

**Cyperus unioides** R. Br. Prodr. Nov. Holl. 216. 1810. *C. bromoides* Willd. ex Link, Jahrb. 3: 85. 1820.

In marshes, 300–1700 meters; Alta Verapaz; Jalapa; Santa Rosa; reported from Sacatepéquez; Huehuetenango. California to Mexico and British Honduras; West Indies; South America. Tropics of Old World.

A perennial with very short rhizomes, the culms cespitose, 20–75 cm. tall, 1.5 mm. thick at the apex, rather stout, smooth; leaves 2–4 to a culm, shorter than the culms, 1–4 mm. wide, rough-margined, the sheaths reddish brown; bracts 2–4, unequal, longer than the inflorescence; rays 2–5, simple, unequal, 15 cm. long or less; spikelets 4–16 in each spike, lax, 10–15 mm. long, compressed, 3–4 mm. wide, 12–24-flowered, the rachilla zigzag; scales 3.8 mm. long, ovate, acute, 3-costate, yellow and red-lineolate, the margins white-hyaline; achene 1 mm. long, lenticular,



obovate, grayish to black, puncticulate, sessile, short-apiculate, conspicuously cellular.

**Cyperus virens** Michx. Fl. Bor. Amer. 1: 28. 1803. *C. virens* var. *glaucopallidus* Boeckl. Linnaea 35: 554. 1868. *Sacabasto*.

Wet soil in quebradas or on lake shores, 1400–2400 meters; Alta Verapaz; Jalapa; Huehuetenango. United States and Mexico; Costa Rica; West Indies; South America.

A coarse perennial with short thick rhizomes, the stout culms 30–90 cm. tall, triquetrous, rough-angled, leafy near the base; leaves equaling or shorter than the culms, 6–10 mm. wide, septate-nodulose, rough-margined, the sheaths purplish; bracts 5–7, very long, the rays of the umbel compound, unequal, 6 cm. long or less; spikelets forming globose heads of 6 or more, ovate-lanceolate or oblong-lanceolate, acute, 6–8 mm. long, 2.5–3 mm. wide, compressed, 10–20-flowered, the rachilla straight, not winged; scales dense, finally patulous, oblong-ovate, subacute, cellular-reticulate, pale rufous or yellowish-stramineous, 3-nerved, sometimes minutely mucronate; achene about three-fifths as long as the glume, oblong or oblong-elliptic, trigonous, rufescent, dull, minutely punctulate, conspicuously stipitate, apiculate.

## DICHROMENA Michaux

Plants usually perennial and with rhizomes, the leaves narrow; spikelets crowded in a terminal head on the leafless culm, involucrate by the leaflike bracts, these often tinged with white within near the base; spikelets compressed, with few or many flowers, the scales spirally imbricate, several of them empty or with imperfect flowers; perianth none; stamens 3; style 2-cleft, the branches subulate; achene lenticular, transversely rugose, crowned with the broad persistent style base (tubercle).

About 20 species, in North and South America, chiefly in the tropics. Only the following species are known from Central America.

Leaves 5–12 mm. wide; bracts green throughout. . . . . *D. Watsoni*

Leaves 2–4 mm. wide; bracts often white at the base.

Bracts glabrous, not ciliate; plants with elongate rhizomes often 10–30 cm. long.

*D. colorata*

Bracts ciliate at the base and sometimes also pilose; rhizomes none or short, rarely as much as 2 cm. long.

Plants with fibrous roots; bracts green throughout; spikelets 1–3, cinnamon-brown when dry. . . . . *D. radicans*

Plants with short rhizomes; bracts white within near the base; spikelets 3–15, white when dry. . . . . *D. ciliata*

**Dichromena ciliata** Vahl, Enum. Pl. 2: 240. 1806. *D. nervosa* Vahl, op. cit. 241. 1806. *Junquillo* (Petén, fide Lundell).

Grassy open places, sometimes in pine forest; Petén; Alta Verapaz; Izabal; Zacapa; Jalapa; Jutiapa; Huehuetenango; at 2000

meters or less; reported also from other departments, but the collections were not seen and their determinations therefore are questionable. Southern Mexico and British Honduras to Panama, southward through much of South America; West Indies.

Plants often in small dense clumps, usually 20–40 cm. high, the rhizomes very short, the culms slender and wiry, sometimes hirsute at the apex; leaves 10–30 cm. long, mostly 1–3 mm. wide, glabrous or often pilose on the margins or beneath, 1-nerved, the sheaths brownish; bracts 4–6, white at the base; spikelets 3–15 and 5–10 mm. long, usually bright white, each containing 3–10 achenes; scales 3–5 mm. long, ovate or lanceolate; achene 1.2 mm. long, suborbicular or ovoid, dark brown, transversely rugose, biconvex, bearing at the apex a wide tubercle.

Although abundant in some parts of Central America, in Guatemala this species appears to be rather rare and of only sporadic occurrence.

**Dichromena colorata** (L.) Hitchcock, Ann. Rept. Mo. Bot. Gard. 4: 141. 1893. *Schoenus coloratus* L. Sp. Pl. 43. 1753. *D. leucocephala* Michx. Fl. Bor. Amer. 1: 37. 1803.

Wet soil, often in savannas, 1600 meters or less; Petén; Zacapa. Eastern and southern United States through Mexico to British Honduras.

Plants 30–50 cm. tall, the rhizomes often 10–30 cm. long, very slender, the slender culms erect; leaves 10–30 cm. long, 1–3 mm. wide, flat or conduplicate, the sheaths pale green or brownish; bracts 4–6 and 1–12 cm. long, similar to the leaves, often reflexed, white at and above the base, glabrous; spikelets numerous, sometimes 30 or more, 6–8 mm. long, each containing 6–10 achenes; scales broadly ovate-lanceolate, 3–4 mm. long, subacute; achene about 0.8 mm. long, truncate at the apex, with a flat tubercle, orbicular to obovate, transversely rugulose.

**Dichromena radicans** Schlecht. & Cham. Linnaea 6: 38. 1831. *Coyolillo*; *Punac* (Cobán, Kekchí).

Usually in wet soil, frequently in ditches or marshes, often in wet or moist forest or thickets, sometimes in open places, frequently a weedy plant, ascending to about 1500 meters but most plentiful at low elevations; Alta Verapaz; Baja Verapaz; Izabal; Chiquimula; Santa Rosa; Guatemala; Suchitepéquez; Retalhuleu; Huehuetenango; Quezaltenango; San Marcos. Mexico to British Honduras and Panama; West Indies and South America.

Plants perennial and densely caespitose, forming small or large clumps, the rhizomes very short or none, the culms 20–40 cm. tall, glabrous; leaves 10–30 cm. long, usually 1–3 mm. wide, flat, 5–9-nerved, ciliolate, the sheaths green or whitish, pubescent; bracts 2–5, 7 cm. long or less, commonly ciliate and also pilose near the base, green throughout; spikelets 1–5, lanceolate, acuminate, 8–10 mm. long,

brownish, at least when dry; scales 4–6 mm. long, ovate or lanceolate; achene lenticular, orbicular, 0.8 mm. long, smooth and lustrous, broadly stipitate, cream-colored, bearing a short tubercle.

**Dichromena Watsoni** Britton, Bull. Torrey Club 15: 101. 1888. Figure 26.

Type collected in Guatemala by Sereno Watson, probably in Izabal; wet forest, usually at low elevations, in western Guatemala ascending to about 1500 meters; Izabal; Alta Verapaz; Huehuetenango; San Marcos (Volcán de Tajumulco). British Honduras to Panama.

Plants rather stout, as much as 60 cm. high, with short or no rhizomes; cauline leaves 15–25 cm. long, 5–12 mm. wide, about 7-nerved, glabrous, the sheaths green; bracts about 9, or fewer, similar to the cauline leaves; spikelets about 9, acute, 12–15 mm. long, greenish white; scales ovate-lanceolate, acute and mucronate, glabrous; achene obovate, transversely rugose, with a broad depressed tubercle.

A relatively rare species of which but few collections are known, these all Central American.

### ELEOCHARIS R. Brown

*Reference:* H. K. Svenson, Monographic studies in the genus *Eleocharis*, Rhodora 31: 121–135; 152–163; 167–191; 199–219; 224–242. 1929; 34: 193–203; 215–227. 1932; 35: 377–389. 1934; 39: 210–231; 236–273. 1937; 41: 1–19; 43–77; 90–110. 1939; Scirpeae, N. Amer. Fl. 18: 509–540. 1957.

Glabrous annuals or perennials; culms simple, terete to trigonous, quadrangular, or compressed; leaves reduced to bladeless basal sheaths; spikelets terminal, solitary, erect, containing several to many flowers; scales concave, spirally imbricate or subdistichous; perianth of 6 or 8 bristles, these mostly retrorse-barbellate; stamens 2–3; style 2–3-cleft; achene lenticular or trigonous; style base enlarged and persistent as a tubercle upon the apex of the achene.

About 150 species, widely distributed in almost all parts of the earth. A few additional species may occur in southern Central America. The following treatment is adapted from that by Svenson. The name is sometimes written *Heleocharis*. Although Dr. Svenson studied and identified our Guatemalan material in 1939 and 1940, the data were not incorporated, for some reason, in the distributional ranges published in the latest treatment in North American Flora. In the present treatment, it will be noted, there are cited for Guatemala and British Honduras, as well as for other Central American countries, numerous species whose distribution was either omitted or incompletely cited in the North American Flora for those countries.





FIG. 26. *Dichromena Watsoni*. a, Habit ( $\times \frac{1}{2}$ ). b, Spikelet ( $\times 4$ ).

Scales firm, somewhat indurate, yellowish, scarcely carinate or nerved. Achenes lenticular; style 2-3-fid; culms usually stout and thick.

Culms septate. . . . . *E. interstincla*

Culms not septate.

Culms terete . . . . . *E. cellulosa*

Culms angulate.

Culms slender, 1-2 mm. thick . . . . . *E. plicarhachis*

Culms stout, 2-5 mm. thick.

Achene constricted below the summit into a neck half as wide as the achene. . . . . *E. fistulosa*

Achene not constricted, gradually prolonged into a cellular beak.

*E. mutata*

Scales thin, conspicuously keeled or nerved. Achenes lenticular or trigonous; culms stout, or often very slender.

Culms septate, sometimes only faintly so, 1-10 mm. thick. Plants perennial.

Culms 1-2 mm. thick; spikelets 8-15 mm. long, much thicker than the culm.

*E. montana*

Culms 3-10 mm. thick; spikelets 15-40 mm. long, not thicker than the culm.

*E. elegans*

Culms not septate, very slender, less than 5 mm. thick, mostly 2 mm. thick or less.

Style branches 2; achenes lenticular, black to reddish brown.

Sheaths firm at the apex. Achene black. . . . . *E. caribaea*

Sheaths membranous at the apex.

Mature achene black. . . . . *E. maculosa*

Mature achene olivaceous.

Spikelets of the same diameter as the culms; bristles shorter than the achene, glistening white. . . . . *E. Sellowiana*

Spikelets much thicker than the culms; bristles longer than or slightly shorter than the achene. . . . . *E. Schaffneri*

Style branches 3; achene trigonous.

Achene longitudinally costate.

Spikelets 3-6-flowered . . . . . *E. nervata*

Spikelets 6-12-flowered . . . . . *E. radicans*

Achene not longitudinally costate.

Achenes conspicuously cancellate, i.e., deeply pitted.

Achene 1-1.3 mm. long. . . . . *E. retroflexa*

Achene 0.5-0.8 mm. long. . . . . *E. minutissima*

Achenes smooth or reticulate, not pitted.

Perianth bristles absent; achene 0.5 mm. long. . . . . *E. nigrescens*

Perianth bristles present; achene usually 0.7-1.5 mm. long.

Plants dwarf, the culms all or mostly 3-7 cm. long. . . . . *E. minima*

Plants relatively tall, the culms all or mostly 10-25 cm. tall or more.

Achene white. . . . . *E. filiculmis*

Achene yellow, olive, or brown.

Style base beak-like, subulate to pyramidal, about one-third as long as the achene.

Spikelets ovoid-fusiform, acute; culms slender, rigid, 1–2 mm. broad . . . . . *E. rostellata*

Spikelets cylindric, obtuse to subacute; culms terete, spongy, 2.5–3 mm. broad . . . . . *E. densa*

Style base broad, much shorter.

Style base conic or pyramidal; achene evidently reticulate.

*E. montevidensis*

Style base mucroniform, its sides almost parallel; achene almost smooth, only faintly reticulate . . . *E. Dombeyana*

***Eleocharis caribaea*** (Rottb.) Blake, *Rhodora* 20: 24. 1918. *Scirpus caribaeus* Rottb. Descr. & Icon. 24. 1773. *Scirpus geniculatus* L. Sp. Pl. 48. 1753 (in part). *Eleocharis capitata* R. Br. Prodr. Fl. Nov. Holl. 225. 1810, not *Scirpus capitatus* L. *Tule*; *Sintule*.

Marshes or wet fields or thickets, often on mud or sand along streams, sometimes in mangrove thickets, ascending from sea level to about 1800 meters; Petén; Alta Verapaz; Baja Verapaz; Izabal; Zacapa; Chiquimula; Jalapa; Escuintla; Guatemala; Sololá; Huehuetenango. United States to Mexico, British Honduras, and Panama; West Indies and South America; Old World tropics.

Plants densely caespitose, usually perennial, the slender culms firm, mostly 15–40 cm. tall, striate and sulcate; sheaths stramineous or brown, the apex firm, oblique, often attenuate; spikelets subglobose or ovoid, obtuse, many-flowered; scales ovate-orbicular, almost cartilaginous to membranous, yellow to pale brown; style 2-fid; stamens 2–3; achene 1 mm. long, obovoid, lustrous black, the style base spongy, whitened, variable in shape but usually much depressed; bristles 6 or 8, coarse, brown, exceeding the achene, rarely absent.

A decoction of the thick roots is used in Huehuetenango as a beverage, with the addition of *atol* or other substances.

***Eleocharis cellulosa*** Torr. Ann. Lyc. N. Y. 3: 298. 1836.

Petén (Lago de Petén); Guatemala (Laguna de Amatitlán), in shallow water. Southern United States and Mexico; Bermuda; British Honduras (Honey Camp, *Lundell* 575); West Indies.

A stout perennial with short rhizomes, the culms mostly terete, 30–75 cm. tall; upper sheaths purplish, with an elongate mucronate tip; lowest sheaths membranous and inflated or leaflike; spikelets cylindric, 1.5–4.5 cm. long, obtuse, thicker than the culm; scales orbicular or obovate, obtuse, 4 mm. long, rigid, striate, stramineous, with a conspicuous brown border and white scarious margins; style 3-fid; stamens 3; achene brown, lustrous, elliptic to obovate, lenticular, with about 20 rows of quadrangular cells, bearing at the summit a stout spongy beak, tipped by the short dark style base; bristles light brown, equaling the achene, without teeth.



**Eleocharis densa** Benth. Pl. Hartw. 27. 1840. *Tule*.

Swampy ground along mountain stream, at 2500 meters or less; Jalapa (between Miramundo and summit of Montaña Miramundo, *Steyermark 32722*). Central Mexico.

A coarse perennial from a thick creeping rhizome, the culms terete, spongy, green, 55–70 cm. tall, 2.5–3 mm. thick, not septate; sheaths thin, purplish at base, brownish near tip, truncate at apex; spikelets large, cylindric, many-flowered, sub-acute or obtuse, 15–35 mm. long; scales appressed, very numerous, with an opaque, pale, broad central area, narrow purplish sides, and scarious apex and margins, rounded at apex, 2.8–3 mm. long; style trifid; achene 1.5 mm. long, trigonous, obovate, pale greenish- or brownish-yellow, shining, lightly punctate-reticulate; style base stramineous to pale brown, flattened, broadly lanceolate, one-third as long as the achene body; bristles stramineous to pale yellowish-brown, equaling or somewhat shorter than the achene.

The identification of the Guatemalan material is provisional. Dr. Svenson indicated that it probably represents an undescribed species resembling the mountain form of *E. montana* (HBK.) R. & S. At present it seems best placed with *E. densa*, a Mexican species with which it agrees most closely in characters of non-septate culms and lightly punctate-reticulate achenes, which are much less reticulate than in either *E. elegans* or *E. montana*.

**Eleocharis Dombeyana** Kunth, Enum. Pl. 2: 145. 1837. *E. montana* Auct., not (HBK.) R. Br.

Moist soil in the central and western mountains, 1200–3500 meters; Chimaltenango; Quiché (San Miguel Uspantán); Huehuetenango. Mexico; Ecuador to Argentina.

Perennial, with elongate creeping rhizomes, the culms mostly 5–30 cm. tall, slender; spikelets ovate to linear-lanceolate, 8–12 mm. long, acute, many-flowered; scales often rather lax, ovate-elliptic, usually acute, brown, with yellowish or green costa and hyaline margin; style 3-fid; achene 1–1.3 mm. long, obovate, lustrous, yellow or brown, trigonous, smooth or very obscurely reticulate; style base mucroniform, acute, usually with almost parallel sides; bristles 4, brown, exceeding or shorter than the achene.

**Eleocharis elegans** (HBK.) Roem. & Schult. Syst. Veg. 2: 150. 1817. *Scirpus geniculatus* L. Sp. Pl. 42. 1753, in part; ed. 2. 71. 1762. *Scirpus elegans* HBK. Nov. Gen. & Sp. 1: 226. 1816. *E. geniculata* Roem. & Schult. Syst. Veg. 2: 150. 1817. *Sintul*; *Tul*; *Tule*; *Guirnalda* (Cobán); *Camalote* (Cobán); *Cebolla de río* (Quezaltenango). Figure 27.

Marshes or wet meadows, in ditches, often in sand along streams, abundant in many regions, ranging from near sea level to about

2000 meters; Alta Verapaz; Baja Verapaz; Zacapa; Chiquimula; Jutiapa; Santa Rosa; Escuintla; El Progreso; Guatemala; Sacatepéquez; Sololá; El Quiché; Suchitepéquez; Retalhuleu; Quezaltenango; San Marcos; Huehuetenango. Mexico and British Honduras to Panama; West Indies; South America.

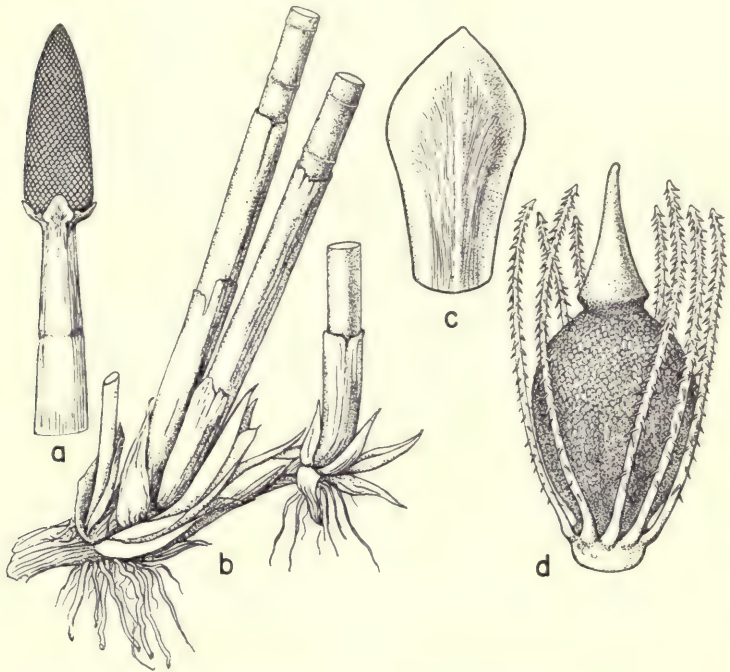


FIG. 27. *Eleocharis elegans*. a, Top of culm with spikelet ( $\times 2$ ). b, Base of culm with rootstock ( $\times \frac{3}{4}$ ). c, Scale ( $\times 17$ ). d, Achene with bristles ( $\times 36$ ).

A coarse perennial, from a thick creeping rhizome, the culms terete, spongy, green, 10–150 cm. tall or higher, 3–10 mm. thick, septate; sheaths reddish, truncate and usually mucronate at the apex; spikelets large, lanceolate to cylindric, usually acute; scales very numerous, 2 mm. long, not carinate, obtuse, thin, with an opaque brown central area and broad, scarious, pale brown margins; style 2–3-fid; achene 1.5 mm. long, obovate, biconvex to slightly trigonous, yellow to brown, lustrous, lightly punctate-reticulate; style base dark brown, flattened, lanceolate, half as long as the body of the achene; bristles deep brown, almost equaling the tubercle.

Known in El Salvador by the names “tul,” “tule,” and “sintule.” In Guatemala, as throughout Central America, the tough spongy culms of this species are much used for weaving the *petates* or *esteras* used as mattresses upon wooden beds, also for other kinds of mats

that are spread upon the floor or employed for other purposes. To those accustomed to the mattresses of the north, they are hard beds indeed, but in Central America they are considered comfortable, at least when new. After having been in use for some time and having become well flattened, they are replaced by new "soft" ones. The stems are much used also for tying bunches of flowers and vegetables for market. The plant is abundant in many marshy places, where it often forms rather dense colonies of considerable extent. Among local species it is easy of recognition because of its thick terete spongy culms.

**Eleocharis filiculmis** Kunth, Enum. Pl. 2: 144. 1837. *Scirpus sulcatus* Roth, Nov. Pl. 1821, not Petit Thouars, 1811. *E. sulcata* Nees, Linnaea 9: 294. 1834. *E. costaricensis* Boeckel. Allgem. Bot. Zeitschr. 2: 34. 1896. *Tule chiquito*.

Marshes, wet meadows, ditches, willow thickets, and sandy stream banks, ascending from sea level to 1900 meters; Alta Verapaz; Izabal; Jalapa; Jutiapa; Escuintla; Sacatepéquez; Chimaltenango; Quiché; Huehuetenango; Retalhuleu; Suchitepéquez. Mexico and British Honduras to Panama; West Indies; South America.

Perennial, erect from an ascending rhizome, the culm slender, 15–40 cm. tall, compressed and sulcate, 1 mm. wide or less, the sheaths purplish brown or stramineous, acute, sometimes slightly inflated at the apex; spikelets ovoid-cylindric, 4–10 mm. long, many-flowered; scales obtuse or emarginate, stramineous or reddish brown, with a paler keel and scarious margins; achene 1 mm. long, trigonous, shining white, often obscurely reticulate or brown-striolate; style base almost as wide as the apex of the achene, irregularly pyramidal, white to light brown; bristles white, usually equaling the achene.

**Eleocharis fistulosa** (Poir.) Link in Spreng. Jahrb. 3: 78. 1820. *Scirpus fistulosus* Poir. in Lam. Encycl. 6: 749. 1804. *Tule*; *Cebolla de agua* (Chiquimula); *Cham* (Huehuetenango).

Marshes, often on lake shores, ascending from sea level to about 2200 meters; Alta Verapaz; Izabal; Chiquimula; Jalapa; Jutiapa; Santa Rosa; Huehuetenango. Texas; southern Mexico; El Salvador; Honduras; Costa Rica; Panama; Cuba; South America; Asia and Africa.

A rather stout perennial with thick rhizomes, the culms somewhat caespitose, acutely trigonous, 40–60 cm. tall, the sheaths brown, membranous, rather loose, pointed at the apex; spikelets 1.5–3.5 cm. long, cylindric, acute; scales 4 mm. long, stramineous or grayish, broadly ovate, obtuse or acutish, coriaceous, striate, the margins erose; style 3-fid; stamens 3; achene 2–2.4 mm. long, obovate, turgid, green or pale brown, rough, with about 20 rows of deeply pitted, quadrangular



cells, the apex narrowed to a neck about one-third the width of the achene, broadening again to form the base of the triangular style; bristles coarse, usually exceeding the achene, toothed.

**Eleocharis interstincta** (Vahl) Roem. & Schult. Syst. Veg. 2: 149. 1817. *Scirpus interstinctus* Vahl, Enum. Pl. 2: 251. 1806.

Bogs or marshes, 600 meters or less; Petén; Izabal; Jutiapa; Huehuetenango. Florida and Texas to Mexico, British Honduras, and Costa Rica; West Indies; South America.

A coarse perennial with thick rhizomes, the culms terete, 40–100 cm. tall, about 5 mm. thick, conspicuously septate; sheaths membranous, pointed; spikelets cylindrical, 1.5–4 cm. long, many-flowered; scales in several ranks, oblong, often acute, striate, stramineous or grayish, with scarious margins; style 2–3-fid; stamens 3; achene 2 mm. long, rough, yellow or gray, with prominent transverse rectangular cells and a pronounced annular thickening at the summit; style base dark brown; bristles 6, longer than the achene, stout, compressed, with coarse teeth.

**Eleocharis maculosa** (Vahl) Roem. & Schult. Syst. Veg. 2: 154. 1817. *Scirpus maculosus* Vahl, Enum. Pl. 2: 247. 1806.

In ditches or along borders of streams and lakes, 1200–2500 meters; Alta Verapaz; Jalapa. British Honduras; Honduras; West Indies; South America.

Perennial, usually densely caespitose, with elongate stolons, the culms mostly low and 7–35 cm. tall, sometimes taller, striate, rigid, slender; apex of the upper sheath conspicuously enlarged and scarious; spikelets 5–12 mm. long, ovoid to lanceolate, many-flowered; scales densely imbricate, subobtusate, firm, lustrous, purplish brown, with scarious margins; style 2-fid; stamens 3; achene obovoid, 1.3–1.5 mm. long, narrowed at the base, black and lustrous, the surface minutely roughened; style base half as wide as the achene, light brown, with a dilated base and a narrow subulate beak; bristles 7–8, reddish brown, unequal, some of them usually equaling the achene, with very small retrorse teeth.

A collection from Cobán is noteworthy in having small spikes borne at the bases of the culms, according to Dr. Svenson, "a character not previously seen by me in this group."

**Eleocharis minima** Kunth, Enum. Pl. 2: 139. 1837. *E. Durandii* Boeckl. Allgem. Bot. Zeitschr. 2: 34. 1896.

Wet soil, often about pools on plains, sometimes on sulphur-impregnated slopes (Volcán de Tecuamburro), 300–2000 meters; Petén; Jalapa; Jutiapa; Santa Rosa; Suchitepéquez. Southern United States to Mexico; British Honduras; El Salvador; Honduras; Costa Rica; West Indies; South America.

Plants small and cespitose, with fibrous roots, the culms capillary, 3-7 cm. tall, quadrangular-sulcate, the sheaths conspicuous, light or dark brown, the apex inflated, obtuse, hyaline; spikelets 2-4 mm. long, ovate, with few or many flowers; scales ovate-lanceolate, mostly acute, dark brown, with greenish costa and hyaline margin; style 3-fid; achene ovate, 0.7-1 mm. long, acutely trigonous, whitish to pale or olivaceous brown, lightly reticulate to minutely striate, narrowed at the base and apex, the style base brownish or gray, short-pyramidal; bristles inconspicuous, white, obscurely toothed, shorter than the achene, often greatly reduced.

**Eleocharis minutissima** Britton, Mem. Torrey Club 16: 60. 1920.

Collected at Honey Camp, British Honduras, wet sand near margin of water hole in pine ridge, *William C. Meyer 111*; probably extending into Petén. Cuba.

Plants densely cespitose, the culms capillary, 1-3 cm. high, somewhat thickened at the base; spikelets ovoid, 1-2 mm. long, loosely 3-7-flowered; scales spreading, ovate, strongly carinate, green to castaneous, with hyaline margins; achene 0.5 mm. long, oblong or obovoid, white to gray, obtusely trigonous, cancellate; style base gray, low, triangular-apiculate, half as wide as the achene; bristles none.

The British Honduras collection was identified by Dr. Svenson. Although the species is cited by him (N. Amer. Fl. 18: 537. 1957) as known only from the type locality, a re-examination of the British Honduras specimen confirms Dr. Svenson's original determination.

**Eleocharis montana** (HBK.) Roem. & Schult. Syst. Veg. 2: 153. 1817. *Scirpus montanus* Roth, Nov. Pl. Sp. 29. 1821. *Scirpus nodulosus* Roth, l.c. *Eleocharis nodulosa* (Roth) Schult. Mant. 2: 87. 1824.

Marshes, ditches, wet fields, and sandbars, 800-2000 meters; Alta Verapaz; Baja Verapaz; Jalapa; Jutiapa; Santa Rosa; Chimaltenango; Quiché; Huehuetenango. Southern United States to Mexico, British Honduras, and Panama; West Indies; South America.

A rather stout perennial with a stout creeping rhizome, the culms 1-2 mm. thick, 30-80 cm. tall, terete, septate; sheaths elongate, usually stramineous, often purplish red at the base, truncate at the apex and distinctly mucronate; spikelets many-flowered, oblong-lanceolate, acuminate or rarely obtuse, 8-15 mm. long; scales appressed or slightly spreading, obtuse or acute, scarious throughout, light or dark brown; style 2-3-fid; achene 1 mm. long, broadly obovate, biconvex, yellow to brown or olivaceous, distinctly pitted-reticulate; style base flattened, brown, half as wide as the achene, deltoid, acute; bristles ferruginous, equaling or slightly exceeding the achene.

**Eleocharis montevidensis** Kunth, Enum. Pl. 2: 144. 1837.  
*E. arenicola* Torr. in Engelm. & Gray, Bost. Journ. Nat. Hist. 5: 237. 1847.

Reported from Guatemala by Svenson, on the basis of *Heyde & Lux 3554*, the determination somewhat uncertain. United States and Mexico; Brazil to Argentina.

Perennial with creeping rhizomes, the slender culms erect, mostly 5–45 cm. tall, striate; upper sheath deep brown at the base; spikelets ovoid to oblong, obtuse, 4–13 mm. long, many-flowered; scales ovate, obtuse, brownish or yellowish, with hyaline margins; style 3-fid; achene 1 mm. long, obovoid, trigonous, with obtuse angles, golden yellow to brown, minutely punctulate to finely reticulate, lustrous; style base conic, short, sessile at the apex of the achene or sometimes with a slight constriction; bristles 4–6, brown, toothed, equaling or shorter than the achene.

**Eleocharis mutata** (L.) Roem. & Schult. Syst. Veg. 2: 155. 1817. *Scirpus mutatus* L. Amoen. Acad. 5: 391. 1759.

In swamps or wet places, at 1000 meters or less; Chiquimula (*Steyermark 31155*); reported from Alta Verapaz. Mexico to British Honduras and Honduras; Nicaragua; Panama; West Indies; tropical South America; tropical Africa.

Plants coarse and stout, from a short caudex, the culms acutely trigonous, 40–100 cm. tall, the sheaths stramineous or light brown, membranous, pointed at the apex, often elongate; spikelets 1.5–5 cm. long, cylindric, usually obtuse; scales many-ranked, stramineous, thin, orbicular or obovate, with broad membranous sides and erose apex, often subcarinate; style 3-fid; stamens 3; achene 1.7–2.3 mm. long, elliptic or obovate, lustrous, rather smooth, yellow to brown, with about 24 rows of shallow, transversely linear cells, surmounted at the apex by an annular thickening which merges gradually into the short style base; bristles 6, irregular, equaling the achene, brown, with coarse teeth.

A specimen from Guatemala, identified by Dr. Svenson as belonging to this species (*Fassett 28844*, from Dept. Santa Rosa), has the achenes definitely constricted below the summit into a beak one-half the width of the achene and must be identified, therefore, as *E. fistulosa*. The *Steyermark 31155* specimen from Dept. Chiquimula has immature achenes, but these are not constricted below the summit.

**Eleocharis nervata** Svenson, Rhodora 31: 204. 1929.

Wet meadows or banks, sometimes on mud flats, 1200–3000 meters; Baja Verapaz; Jalapa; Chimaltenango; El Quiché; Quezaltenango; San Marcos. Southern Mexico; El Salvador; Costa Rica.



Plants slender and delicate, with slender elongate rhizomes, the culms soft, filiform, 3–10 cm. long, obscurely striate and angulate; upper sheaths appressed, membranaceous and marcescent, yellowish, hyaline at the apex; spikelets ovate, 2–3 mm. long, 3–5-flowered; scales ovate, acute or obtuse, lax at maturity, carinate, green or the sides sometimes rufescent; style 3-fid; stamens 3; achene 1.2–1.5 mm. long, narrowly obovate, longitudinally costulate; style base conic; bristles 3, scarcely as long as the achene.

**Eleocharis nigrescens** (Nees) Steud. Syn. Cyp. 77. 1855. *Scirpidium nigrescens* Nees, Linnaea 9: 293. 1843. *E. minutiflora* Boeckl. Bot. Jahrb. 7: 274. 1886. *E. nigrescens* var. *minutiflora* Svenson, Rhodora 39: 226. 1937.

The species and variety have been collected in British Honduras (*W. C. Meyer 109*, from Honey Camp) and Campeche, and are to be expected in Petén, if not elsewhere in Guatemala. South Carolina; Mexico; West Indies; Trinidad; Brazil; Africa; Madagascar; Australia.

A caespitose annual with fibrous roots, or a perennial with rhizomes, the culms filiform, erect, 3–7 cm. tall or sometimes even higher, obscurely quadrangular-sulcate; sheaths red or greenish, the apex marcescent; spikelets many-flowered, ovoid, 2–3 mm. long; scales chestnut-brown with a greenish costa, obtuse to emarginate, scarcely carinate, lax at maturity; style 3-fid; mature achenes trigonous, 0.6 mm. long, smooth, light yellowish brown, whitened with prominent costulate angles, immature achenes with obscure striolate reticulation; style base brown or light gray, pyramidal, one-third as wide as the achene; bristles none.

**Eleocharis plicarhachis** (Griseb.) Svenson, Rhodora 31: 158. 1929. *Scirpus plicarhachis* Griseb. Cat. Pl. Cub. 239. 1866.

Bogs or wet meadows, 600 meters or less; Petén; Alta Verapaz; Izabal; Jutiapa. Southern Mexico; Cuba; Panama to Argentina and Paraguay.

Perennial, erect from a spongy rhizome, the culms stiff, 25–60 cm. tall, wiry, flexuous, striate and sulcate; sheaths usually rigid, 4–8 cm. long, purplish or stramineous, oblique at the apex; spikelets 1–2 cm. long, about 25-flowered, narrowly cylindric, acute; scales loose, 3.5 mm. long, linear, obtuse, striate, with an evident costa; style 2-fid; stamens 3; achene biconvex, 2 mm. long, light brown, orbicular to obovate, with about 12 or more longitudinal rows of quadrate cells, narrowed at the summit and surmounted by a turgid ringlike elevation from which rises the deep brown or black, lanceolate style base; bristles 6, longer than the achene, compressed, toothed.

**Eleocharis radicans** (Poir.) Kunth, Enum. Pl. 2: 142. 1837. *Scirpus radicans* Poir. in Lam. Encycl. 6: 751. 1804.

In marshes, wet meadows or fields, moist banks, often along streams, especially on sandbars, 300–2000 meters; Alta Verapaz; Baja Verapaz; Zacapa; Escuintla; Santa Rosa; Guatemala; Sacatepéquez; Chimaltenango; Sololá; Quezaltenango; Huehuetenango. United States to Mexico; West Indies; southern South America; Hawaii.

Plants low and slender, with creeping rhizomes, often forming dense mats, the culms 3–8 cm. tall, soft and spongy, striate; sheaths membranous, fugacious; spikelets ovate, acute, 3–4 mm. long, 6–12-flowered; scales ovate-lanceolate, the lower obtuse, green, striate, the upper often strongly carinate at the apex; style 3-fid; stamens 3; achene narrowly obovate, yellowish, 0.7 mm. long, with elevated longitudinal ridges and about 30–40 close trabeculae in a longitudinal series; bristles usually 4, very slender, white, retrorsely toothed, exceeding the achene.

**Eleocharis retroflexa** (Poir.) Urban, *Symb. Antill.* 2: 165. 1900. *Scirpus retroflexus* Poir. in *Lam. Encycl.* 6: 753. 1804. *E. Chaetaria* Auct., not Roem. & Schult. (an Old World species).

Wet fields or stream banks, ranging from sea level to about 2600 meters; Alta Verapaz; Izabal; Chiquimula; Santa Rosa; Escuintla; Guatemala; Suchitepéquez; Quiché; Quezaltenango. Alabama; British Honduras to Panama; West Indies; South America.

Plants probably annual, caespitose, with fibrous roots, often proliferous, the culms filiform, usually recurved, 2–5 cm. long, compressed or quadrangular-sulcate; sheaths stramineous to reddish, obtuse, scarious and inflated at the apex; spikelets with few or many flowers; scales usually spreading in fruit, green, carinate, obtuse to acute, often with chestnut or reddish brown sides; style 3-fid; achene 1–1.2 mm. long, trigonous, cancellate, costate, obovoid to urceolate, white or stramineous; style base light brown, as wide as the body of the achene and one-third as long, pyramidal-acuminate, the angles decurrent on the costae of the achene; bristles white, shorter than the achene.

This species grows abundantly along some of the streams in the Pacific lowlands, usually on banks that are wet by spray from the current. The plants often form extensive, dense and bright green carpets in such situations.

**Eleocharis rostellata** Torrey, *Fl. N. Y.* 2: 347. 1843.

At edges of swamps, 300 meters; Huehuetenango (Ciénaga de Lagartero, below Miramar, *Steyermark* 51526). British Columbia and United States; Mexico; West Indies. Andes of Ecuador and Argentina.

Plants erect from a short vertical rootstock; culms wiry, conspicuously flattened and sulcate, mostly 5–90 cm. long, sometimes longer, 1–2 mm. thick; sheaths rigid, truncate or oblique at the apex; spikelets fusiform, acute, 12–20-flowered,

8–20 mm. long; scales light brown, rigid, ovate, the uppermost acute; stamens 3; style 3-fid; achene obovoid, obtusely triangular or plano-convex, olive, lustrous, slightly reticulate, 2–3 mm. long, narrowed into the obtuse, pale green, rostrate style base, this about one-third as long as the achene; bristles firm, regularly dentate, light brown, equaling the achene.

***Eleocharis Schaffneri* Boeckel. Bot. Jahrb. 7: 274. 1886.**

Wet plains and swamp borders, 850–1800 meters; Jalapa; Jutiapa; Quiché; Huehuetenango. Southern Mexico; Honduras; Nicaragua; Costa Rica.

Plants small and slender, cespitose, with fibrous roots, the culms light green, capillary, setaceous, spreading, 3–5 cm. long, sulcate; apex of the upper sheath membranous, scarcely inflated, obtuse; spikelets ovate, acutish, 2–3 mm. long, 7–15-flowered; scales membranous, green, sometimes with light reddish or bronze sides, broadly ovate, obtuse or acute; style 2-fid; stamens 2–3; achene 0.7 mm. long, olive-green, the surface with elongate black striations; style base very small, flattened, gray, slightly apiculate, one-fourth as wide as the achene; bristles 6–7, white, somewhat shorter than the achene.

***Eleocharis Sellowiana* Kunth, Enum. 2: 149. 1837. ?*E. Tuerckheimii* Boeckel. Cyp. Nov. 1: 16. 1888 (type from Cobán, Alta Verapaz, *Tuerckheim* 430).**

Swamps or wet meadows, 1300–1500 meters; Alta Verapaz; Jalapa. El Salvador; Honduras; Costa Rica; South America.

Culms numerous, erect, somewhat spongy, 8–15 cm. tall, 1.5–2 mm. thick, striate; upper sheath with a hyaline fugacious apex; spikelets ellipsoid, 5–10 mm. long, acute, many-flowered; scales appressed, oblong, obtuse, scarcely carinate, stramineous, with a narrow brown stripe on each side of the costa; style 2-fid; stamens 3; achene 0.8–1 mm. long, broadly obovate, turgid-lenticular, olivaceous, shining, minutely black-striate; style base yellowish green, short-conic, acute, about one-fourth as wide as the achene; bristles 7–8, white, shorter than the achene.

## FIMBRISTYLIS Vahl

*Reference:* H. K. Svenson, Scirpeae, N. Amer. Fl. 18: 550–555. 1957.

Annuals or perennials, the culms leafy at or near the base; spikelets umbellate or capitate, terete, with several to many flowers, subtended by an involucre of one to many leaflike bracts; scales spirally imbricate, usually deciduous, all fertile; perianth none; stamens 1–3; style 2–3-cleft, its base enlarged, deciduous at maturity from the apex of the achene; achene lenticular, biconvex, or 3-angulate.

A genus of about 125 species, in temperate and tropical regions of the whole earth, but chiefly of the Old World tropics. Only the following species are known from Central America.



Style branches 3; achenes trigonous.

Spikelets globose or subglobose, rounded at the apex, 2–4 mm. long; scales rounded or very obtuse at the apex. . . . . *F. miliacea*

Spikelets linear to linear-oblong, much longer than broad, acute to acuminate, 4–10 mm. long; scales mucronate.

Culms slender, 0.5–1 mm. wide at the apex, compressed-triangular; leaves very slender, 0.5–2.5 mm. wide. . . . . *F. autumnalis*

Culms more robust, 1.5–3 mm. wide at the apex, strongly compressed; leaves 2–6 mm. wide. . . . . *F. complanata*

Style branches 2; achenes lenticular.

Spikelets glomerulate.

Bracts slender, much exceeding the inflorescence; achenes stramineous, transversely reticulate; small annuals. . . . . *F. VahlII*

Bracts not exceeding the inflorescence; achenes nearly black, with superficial isodiametric reticulation; perennials 1–4 dm. tall. . . . . *F. spathacea*

Spikelets mostly on elongate rays.

Achenes longitudinally ribbed; plants usually annual. . . . . *F. dichotoma*

Achenes coarsely cellular or deeply pitted on surface; plants perennial. . . . . *F. spadicea*

**Fimbristylis autumnalis** (L.) Roem. & Schult. Syst. Veg. 2: 97. 1817. *Scirpus autumnalis* L. Mant. Pl. 2: 180. 1771.

Sandy soil of the Pacific plains, or in oak forest, at 1400 meters or less; Retalhuleu; San Marcos. United States to British Honduras; El Salvador; Nicaragua; Cuba.

A slender annual, the culms 10–40 cm. tall, 0.5–1 mm. thick at the apex, glabrous or antrorsely scaberulous; leaves tufted at the base of the culms, much shorter than the culms, 0.5–2.5 mm. wide, glabrous or antrorsely scaberulous, the sheaths greenish or brownish; bracts 3–5 and 1–3 cm. long, usually shorter than the umbel; umbel simple or decompound; rays of the umbel 4–8, bearing numerous spikelets, these ovoid to narrowly cylindric, sessile or peduncled, terete, many-flowered, 4–10 mm. long, 1–2 mm. wide; scales ovate to ovate-lanceolate, thin, mucronate, dull brown with a greenish keel, 1.5 mm. long; achene trigonous, obovate, 0.4–0.5 mm. long, buff to pale yellow, smooth to faintly reticulate.

**Fimbristylis complanata** (Retz.) Link, Hort. Berol. 1: 292. 1827. *Scirpus complanatus* Retz. Obs. Bot. 5: 14. 1789.

In marshes or wet soil, 300 meters or less; Izabal; Huehuetenango. Mexico; British Honduras; Honduras; Panama; West Indies; South America; Old World tropics.

Perennial from a thick hard base, the culms 20–60 cm. tall, 1.5–3 mm. thick at the apex, glabrous or scaberulous on the angles; leaves clustered at the base of the plant, much shorter than the culms, 2–6 mm. wide, the margins smooth or antrorsely scaberulous; bracts 3–5, shorter than the inflorescence, unequal, the rays 4–8, branched, unequal; spikelets 4–10 mm. long, 2 mm. wide, ovoid to linear, terete, many-flowered; scales 1.5 mm. long, ovate or ovate-lanceolate, thin, mucro-

nate, brown; achene 0.8–0.9 mm. long, trigonous, obovoid, pale yellow, faintly reticulate.

**Fimbristylis dichotoma** (L.) Vahl, Enum. Pl. 2: 287. 1806. *Scirpus dichotomus* L. Sp. Pl. 50. 1753. *Scirpus annuus* All. Fl. Pedem. 2: 277. 1785. *Scirpus diphyllus* Retz. Obs. Bot. 4: 15. 1791. *Fimbristylis annua* (All.) Roem. & Schult. Syst. Veg. 2: 95. 1817. Figure 28.

A common plant of wet or moist soil, often in waste ground or ditches, wet fields, or on sand or gravel bars of stream beds, most common at low elevations, but ranging from sea level to about 2000 meters; Petén; Alta Verapaz; Izabal; Zacapa; Chiquimula; Jalapa; Jutiapa; Suchitepéquez; Retalhuleu; San Marcos; Quiché; Huehuetenango. United States to Panama, and generally distributed in West Indies and South America; widely dispersed in Old World tropics.

Plants usually annual, but sometimes enduring for more than a single year, the culms usually cespitose, 5–50 cm. tall, glabrous or sparsely pilose; leaves much shorter than the culms, 1–2 mm. wide, 5–20 mm. long, acute, with involute margins, glabrous or pilose, the sheaths greenish or brownish; bracts 3–5, short, unequal; umbel with 3–5 rays, the inflorescence a simple or compound umbel with usually numerous spikelets, the culm rarely bearing a single spikelet; spikelets 4–10 mm. long, 2–3 mm. thick, ovoid or oblong-ovoid, pedicellate; scales broadly ovate, 1-nerved, rounded and apiculate at the apex, reddish brown; achene 0.7–1 mm. long, obovate, whitish or pale brown, conspicuously striate vertically.

Most Central American plants are glabrous or nearly so. A form with a single spikelet terminating each culm has been collected at Zacapa, and at various other places in Central America, but it is not common.

**Fimbristylis miliacea** (L.) Vahl, Enum. Pl. 2: 287. 1806. *Scirpus miliaceus* L. Syst. Nat. ed. 10. 868. 1759.

Wet fields or thickets, sometimes in swamps or marshes or along streams, chiefly at low elevations, ascending to about 1000 meters; Petén; Izabal; Zacapa; Jutiapa; Santa Rosa; Suchitepéquez; Retalhuleu. United States to Mexico, British Honduras, and Panama, southward in South America; West Indies; Old World tropics.

A glabrous annual, the culms densely cespitose, 10–70 cm. tall, 1 mm. thick at the apex; leaves 10–30 cm. long, often equaling the culms, 1–3 mm. wide, thin, scaberulous on the margins, the sheaths green or pale brown; bracts none or minute; rays of the umbel 3–6, branched; spikelets 2–4 mm. long, subglobose, brown, 20–40-flowered; scales 1 mm. long, ovate, thin, rounded at the apex and shortly mucronate, carinate; achene 0.5 mm. long, obovoid, pale brown, minutely reticulate.



FIG. 28. *Fimbristylis dichotoma*. a, Habit ( $\times \frac{1}{2}$ ). b, Achene ( $\times 25$ ). c, Scale ( $\times 17$ ). d, Head of spikelets ( $\times 4$ ).



**Fimbristylis spadicea** (L.) Vahl, Enum. Pl. 2: 294. 1806. *Scirpus spadiceus* L. Sp. Pl. 51. 1753. *Tul fino* (Amatitlán); *Espárrago* (Puerto de San José; probably a corruption of *Esparto*).

In wet soil about streams or swamps, most often in saline flats along the seacoast, ascending to about 1200 meters; British Honduras and Quintana Roo and to be expected in Petén; Zacapa; Jutiapa; Escuintla; Guatemala; Retalhuleu; San Marcos. United States to Mexico and Panama; West Indies; South America.

Plants perennial, glabrous, the rhizomes short, thick, and hard; culms few or numerous, 30–60 cm. tall or more, 1–2 mm. thick at the apex, septate-nodulose, covered at the base by black or dark brown sheaths; leaves 20–60 cm. long, 1–3 mm. wide, coriaceous, scaberulous on the margins; bracts shorter or longer than the inflorescence, few, 10 cm. long or less; umbel with 3–6 rays, these usually branched, unequal; spikelets usually numerous, 5–16 mm. long, 3 mm. or more in diameter, terete, oblong-ovate or cylindric, pedicellate, 30–50-flowered; scales 3–4 mm. long, ovate, thick-chartaceous, minutely cuspidate, dark brown; achene 1.5–1.8 mm. long, lenticular, obovate, brown to black, coarsely cellular, substipitate, truncate at the apex.

**Fimbristylis spathacea** Roth, Nov. Pl. 24. 1821.

Salt flats along or near the seashore; Izabal. Southern Mexico and British Honduras to Panama; West Indies and South America; Old World tropics.

Plants perennial, glabrous, densely cespitose, with very short, thick rhizomes; culms 10–50 cm. tall, 1–1.5 mm. thick at the apex, compressed, smooth, rigid; leaves very numerous, forming a dense basal cluster, 5–20 cm. long, 1–3 mm. wide, coriaceous, the sheaths brown; bracts 3–4, scarcely longer than the inflorescence; rays of the umbel numerous, branched, the whole inflorescence small and compact, with very numerous spikelets; spikelets ellipsoid to short-cylindric, 3–6 mm. long, 1.5–2 mm. wide, subcompressed, 12–20-flowered, pedicellate; scales 1.5 mm. long, ovate, thin, rounded at the apex, not cuspidate, light to dark brown with hyaline margins; achene lenticular, 0.5–0.8 mm. long, broadly obovate, neither apiculate nor stipitate, rugulose with minute reticulation, dark brown to blackish.

One of the typical beach plants of Central America.

**Fimbristylis VahlII** (Lam.) Link, Hort. Berol. 1: 287. 1827. *Scirpus VahlII* ("VahlII") Lamb. Tab. Encycl. 1: 139. 1791.

Open pine ridge, 200 meters or less; British Honduras (Swasey Branch, Monkey River, Toledo District, *Gentle 3871*). Southern United States; Nicaragua; South America.

Cespitose annual with capillary culms 1–15 cm. high, or with the spikelets often sessile at the base; leaves filiform, nearly equaling the culms, roughened; involucrel bracts filiform, much exceeding the capitate clusters of 3–8 spikelets;

spikelets oblong-cylindric, obtuse, 4–8 mm. long, many-flowered; scales oblong-lanceolate, acuminate, green to dull brown, with prominent midrib; achene obovate, 0.4 mm. long, stramineous, translucent, prominently reticulate with horizontally elongated cells.

### FUIRENA Rottboell

*Reference:* Henry K. Svenson, Scirpeae, N. Amer. Fl. 18: 505–507. 1957.

More or less pubescent perennial plants, erect or nearly so, with short or elongate rootstocks, the culms trigonous, leafy from the base to the apex, nodose; leaves relatively broad, the sheaths usually covering all or the greater part of the culm; inflorescence of terminal and axillary, headlike clusters of spikelets; spikelets many-flowered, ovoid; scales spirally imbricate, awned, pubescent, the lower 1–2 empty; flowers perfect; perianth of 3 sessile or stipitate scales and sometimes of 3 additional barbellate bristles, or of 6 bristles; stamens 3; style 3-cleft, not enlarged at the base, deciduous; achene trigonous, obovoid or ovoid, smooth, often stipitate.

About 30 species in warmer regions of both hemispheres. Probably no additional species occur in Central America. Three of the species listed here are well illustrated by O'Neill (Carnegie Inst. Wash. Publ. 522: 297. f. 3. 1940).

Perianth of 6 slender retrorsely toothed bristles.....*F. incompleta*  
Perianth with 3 inner bristles (scales) ovate-thickened above.

Three outer bristles present, capillary to filiform.

Scales of the spikelet with short erect mucro 1 mm. long; spikelets erect.

*F. robusta*

Scales of the spikelet with a long filiform awn; spikelets spreading or reflexed.

*F. simplex*

Three outer bristles lacking, only the thickened scales present.

Perianth scales membranous, with a slender recurved apical awn.

*F. umbellata*

Perianth scales spongy-thickened at the apex; apical bristle usually lacking.

*F. bulbipes*

**Fuirena bulbipes** Blake, Contr. U. S. Nat. Herb. 24: 2. 1922.

Ditches or wet fields, 180 meters or less, Izabal (type collected along railroad near Cristina, Blake 7578); Alta Verapaz. Yucatan; Chiapas; British Honduras; Cuba.

Rootstocks slender, creeping; culms bulbous-thickened at the base, 60–90 cm. tall, the lower internodes hispid-pilose, the upper ones glabrous; sheaths of the leaves hispid-pilose; blades flat, 3.5–15 cm. long, 5–12 mm. wide, about 6-nerved, hispidulous above, hispid-pilose beneath and on the margins; panicles elongate, the numerous spikelets sessile in heads of 3–8, ovoid or ellipsoid, 5–6 mm. long; scales obovate, pale brown, ciliate, about 2 mm. long, 3-nerved and mucronate; perianth scales about equaling the achene, stipitate, obovate-oval, papillose-puber-

ulous and ciliate, at the tip contracted into a bulbous-thickened appendage, this with a short slender apex; achene obovoid-trigonal, pale brown, lustrous, 0.8 mm. long.

O'Neill suggests that because of the great variation in pubescence of this plant, it may be a hybrid, perhaps between *F. simplex* and *F. umbellata*. Svenson believes that this species may be derived from *F. umbellata*.

***Fuirena incompleta*** Nees in Mart. Fl. Bras. 2, pt. 1: 107. 1842.

Boggy ground of swamps, at 1350–2200 meters; Alta Verapaz; El Progreso; Jalapa; Huehuetenango. Mexico; Honduras; Panama; South America.

Perennial with creeping rootstocks; culms slender, 40–60 cm. tall; leaves narrow, stiff, 5–12 cm. long, 2–5 mm. wide, glabrous to pubescent; inflorescence of small dense heads of 4–10 spikelets in a terminal panicle; spikelets oblong or ellipsoid, 8–12 mm. long; scales broadly ovate, dull gray- or plumbeous-green, pubescent, aristate with an awn 1.5–2 mm. long; bristles usually 6, slender, retrorsely barbellate, equaling or exceeding the short-beaked achene.

***Fuirena robusta*** Kunth, Enum. Pl. 2: 185. 1837.

Margins of bogs or lake shores near sea level; Izabal (shores of Lago Izabal, *Steyermark 39596*). Tabasco; Panama; Cuba; South America.

Plants robust, glabrous or nearly so, 1–2 meters tall, bearing numerous leaves, often 5 mm. thick or more, spongy; leaves very large and broad, as much as 30 cm. long and 2 cm. wide, some of the leaves shorter, scaberrulous on the margins, 5–7-nerved, acute; spikelets very numerous, forming a short or elongate panicle, brown, ovoid or globose-ovoid, acute, commonly 7–8 mm. long; scales appressed, puberulent, rounded and short-mucronate at the apex; bristles slender, nearly equaling the scales, usually smooth; perianth scales ovate-lanceolate, slender-stipitate, mucronate, much longer than the fruit; achene ovoid, smooth, whitish or brownish.

***Fuirena simplex*** Vahl, Enum. Pl. 2: 384. 1806. *F. zacapana* Bartlett, Proc. Amer. Acad. 43: 50. 1907 (type from swamps at Gualán, Zacapa, *Deam 423*). *Tubux* (Petén, Maya).

In bogs or marshes or along streams, chiefly at low elevations but ascending to about 1800 meters; Petén; Zacapa; Chiquimula; Quiché; Huehuetenango. United States to Mexico and British Honduras; Nicaragua; Cuba.

Plants erect, with short, ligneous, creeping, occasionally tuber-bearing rootstock; culms usually caespitose, angled, 10–80 cm. tall, glabrous; leaves about 6 on each culm, 3–25 cm. long, mostly 3–10 mm. wide, glabrous on the upper surface, sometimes sparsely pilose or densely hispid beneath, rough on the margins, long-



acuminate, the sheaths green, the upper ones glabrous, the lowest sometimes sparsely pilose; spikelets few or numerous in capitate terminal or axillary clusters, about 2-8 in each head, 6-15 mm. long, ovoid or oblong-ovoid; scales brown, hispid with prominent spreading awns; perianth bristles 3, barbellate, usually longer than the achene; perianth scales long-stipitate, obtuse or retuse, short-awned; achene yellowish-brown, about 1 mm. long, ovoid, stipitate, the long, somewhat thickened beak glabrous.

**Fuirena umbellata** Rottb. Descr. & Icon. 70. *pl.* 19, *f.* 3. 1773.  
*Coyolillo mozote* (fide Aguilar).

Wet soil of ditches, swamps, or fields, at or little above sea level; Izabal; Santa Rosa; reported, perhaps in error, from Sacatepéquez (Dueñas, *Salvin*). Southern Mexico and British Honduras to Panama, and elsewhere in tropical regions of both hemispheres.

Plants with short, thick, occasionally tuber-bearing rootstocks, the culms 40-150 cm. tall, often 4-angled; leaves about 5-8 on each culm, 6-16 cm. long, commonly 5-25 mm. wide, 5-9-nerved, glabrous on the upper surface, scaberulous beneath, the sheaths loose, usually glabrous, green; panicles pilose, 1-5, terminal and in the upper leaf-axils; spikelets in few or many capitate clusters, oblong to linear-oblong, 6-10 mm. long; scales greenish-brown, about 2 mm. long, obovate, rounded to emarginate at the apex, the 3 nerves confluent at the apex and excurrent as a spreading or recurved awn, hyaline, strigillose and sometimes hirsute; 3 outer bristles none; perianth scales nearly sessile, obovate, hyaline, 3-nerved, truncate or rounded at the apex and thin, the midrib excurrent as an uncinat mucro; achene about 1 mm. long, ovoid-trigonus, brown or white, stipitate.

### HEMICARPHA Nees & Arnott

Small annuals, usually only a few centimeters tall, with tufted, erect or spreading, almost filiform culms and leaves; spikelets small, terete, terminal, capitate or solitary, subtended by an involucre of 1-3 leaflike bracts; scales spirally imbricate, deciduous, all fertile, the flowers perfect, a single hyaline scale present between the flower and the rachis of the spikelet; bristles none; stamen 1; style 2-cleft, deciduous, the base not enlarged; achene oblong, turgid or lenticular.

About 5 species in temperate and tropical regions of both hemispheres. A single species is found in Central America.

**Hemicarpha micrantha** (Vahl) Pax in Engl. & Prantl, *Pflanzenfam.* 2, pt. 2: 105. *f.* 113. 1887. *Scirpus micranthus* Vahl, *Enum. Pl.* 2: 254. 1806. *H. subsquarrosa* Nees in Mart. *Fl. Bras.* 2, pt. 1: 61. 1842.

On sandbars or in wet soil, scarce, ranging from near sea level to about 1400 meters; Guatemala; Suchitepéquez; Sololá (Atitlán). United States and Mexico to British Honduras and Costa Rica; Guadeloupe and Martinique; South America.

Plants glabrous, the filiform culms usually numerous, 2–20 cm. tall, weak, striate; leaves 1–2 on each culm, often reduced to purplish sheaths or sometimes with blades 1–3 cm. long; terminal bract erect, appearing like a prolongation of the culm, 1–3 cm. long; spikelets 2–4, terete, ovoid, about 3 mm. long, densely many-flowered; scales about 1 mm. long, obovate, mucronulate, reddish brown, thin; perianth scale only 0.1 mm. long; achene cylindric or obovate-oblong, 0.5 mm. long, purplish brown, terete, minutely cellular.

Apparently scarce in Guatemala, or perhaps persisting for only a short time during the rainy season. Only one collection of the plant has been made by the authors.

### HYPOLYTRUM L. Richard

Coarse perennials with leafy stems and thick rootstocks; inflorescence corymbose-paniculate, the bracts unequal, large, leaflike; spikelets usually numerous, several-many-flowered, the flowers perfect or monoecious; scales spirally imbricate, some of the lowest ones empty, the flowers complanate; hypogynous scales 2, lateral, complicate; bristles none; stamens 3 or fewer; style continuous with the ovary, not thickened at the base, the stigma branches 2–3, filiform; achene obtusely angular or compressed, erostrate, smooth or rugulose.

About 50 species in the tropics of both hemispheres. Only one is known from Central America.

**Hypolytrum Schraderianum** Nees in Mart. Fl. Bras. 2, pt. 1: 65. t. 5. 1842. *H. nicaraguense* Liebm. Dansk. Vid. Selsk. Skr. 2: 235. 1851. Figure 29.

Wet forest or in wooded or rather open swamps of Petén; the north coast, at or but little above sea level; Petén (Río Pasión); Alta Verapaz; Izabal. Tabasco and British Honduras to Panama; Brazil.

Plants monoecious, glabrous, with short rhizomes, the culms 120 cm. high or less, 6–12 mm. thick near the base, trigonous, smooth; leaves 4–6 on each culm, 60–80 cm. long, 2–3.5 cm. wide, flat, coriaceous, conspicuously costate and nerved, rough on the margins, the lower sheaths purplish; bracts 1 or 2, like the leaves but smaller; inflorescence a single dense corymb 10–15 cm. broad; spikelets 1.5 mm. long, spicate or capitate, strongly compressed, consisting of 3 flowers, the scales brownish; stamen 1; achene 3 mm. long, ovoid, terete, acuminate-umbonate, at the base broadly cuneate, pale gray, red-punctulate.

In Central America confined to the Atlantic coastal region.

### KYLLINGA Rottboell

Annuals or perennials, the culms slender, trigonous, leafy at the base, the leaves sometimes reduced to bladeless sheaths; bracts 2 or more, leaflike, subtending the dense, simple or compound heads of small spikelets; spikelets numerous, deciduous from the axis of the head at maturity, consisting of only 3–4 scales, the

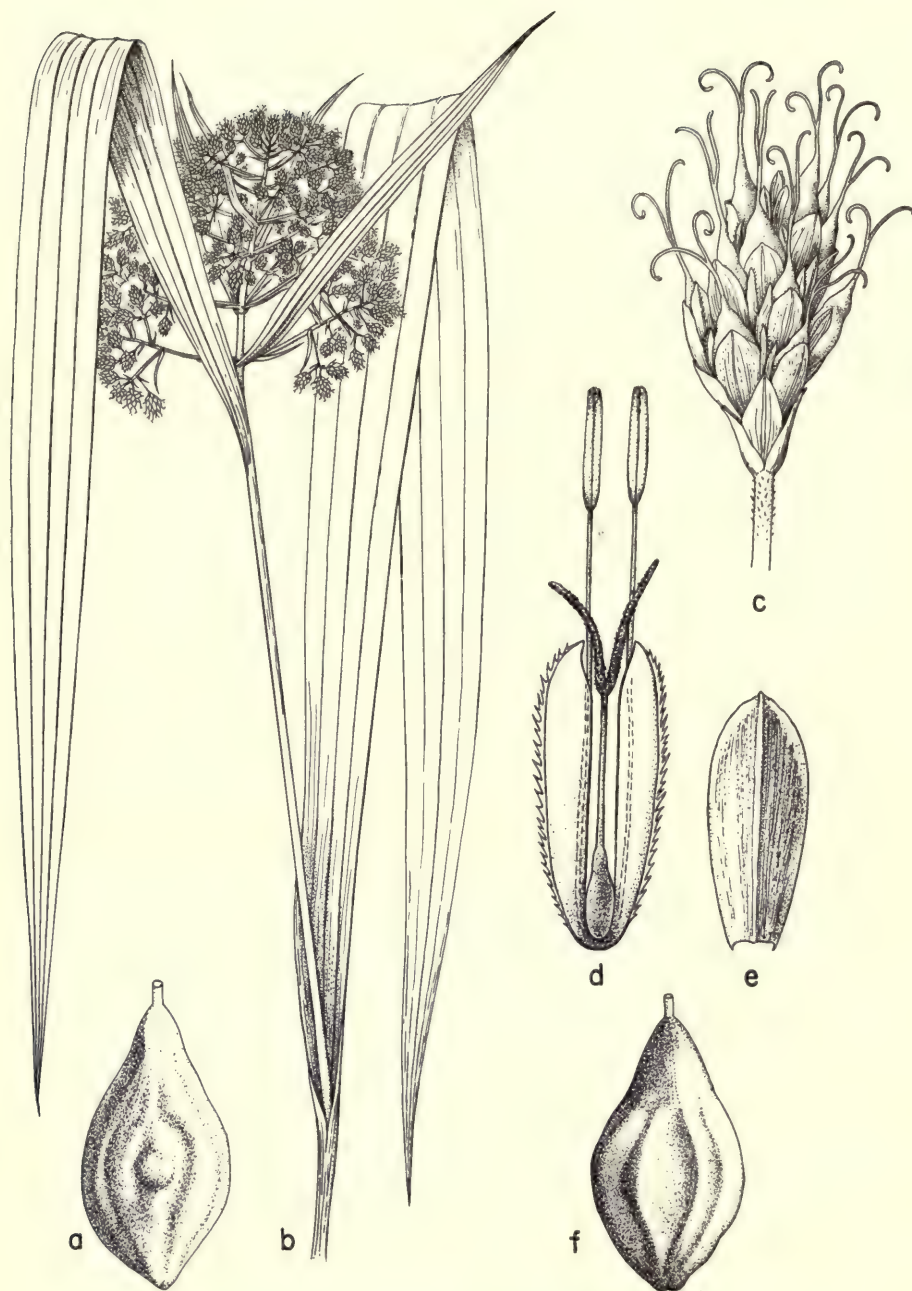


FIG. 29. *Hypolytrum Schraderianum*. a, Achene ( $\times 13$ ). b, Upper part of flowering shoot with leaves ( $\times \frac{1}{2}$ ). c, Head of spikelets ( $\times 10$ ). d, Flower ( $\times 20$ ). e, Scale ( $\times 28$ ). f, Achene ( $\times 13$ ).



1-2 lowest scales empty, the middle one fertile, the upper empty or staminate; scales 2-ranked, carinate; perianth none; stamens 1-3; style 2-cleft, deciduous from the achene, not thickened at the base; achene lenticular.

About 45 species, in tropical and temperate regions of both hemispheres. No others are known from continental Central America. By recent monographers of the family this genus has been combined with *Cyperus*. In habit, however, the group is fairly well marked, and it is probably just as well to maintain *Kyllinga* as a distinct genus, as has been done by most botanists for more than a century.

Leaves all reduced to bladeless sheaths, these with scarios margins. . . *K. peruviana*  
Leaves with well-developed blades.

Plants annual, the culms densely cespitose. . . . . *K. pumila*

Plants perennial, with well-developed rhizomes, the culms not cespitose.

Culms stout, about 1.5 mm. thick at the apex; leaves acute, much shorter than the culms. . . . . *K. pungens*

Culms very slender, about 0.5 mm. thick at the apex; leaves attenuate, usually almost or quite equaling the culms. . . . . *K. brevifolia*

**Kyllinga brevifolia** Rottb. Desc. & Icon. 13. pl. 4, f. 3. 1773.

*Cyperus brevifolius* Hassk. Bort. Bogor. 24. 1844.

In ditches or wet fields or forest, often along streams, ascending from sea level to about 2500 meters, most plentiful at lower elevations; Petén; Izabal; Zacapa; Jutiapa; Guatemala; Sacatepéquez; Chimaltenango; Huehuetenango; San Marcos; doubtless also in other departments. Southern United States to Mexico, British Honduras, and Panama, south to Argentina; West Indies; also in the Old World.

Plant perennial, with slender, short or elongate rhizomes; culms 10-50 cm. tall, 0.5 mm. thick at the apex; leaves 1-4 to a culm, 1-15 cm. long, 1-3 mm. wide, scaberulous on the costa and margins, the sheaths reddish or yellowish; bracts 3-4, unequal; spike usually 1, sessile, ovoid or subglobose, 3-8 mm. long; spikelets numerous, 2-3.5 mm. long, elliptic or oblong-lanceolate; scales about 2 mm. long, ovate or ovate-elliptic, membranous, mucronate, the keel scaberulous; achene 1 mm. long, lenticular, ellipsoid or obovate-oblong, brown, minutely punctulate.

**Kyllinga peruviana** Lam. Encycl. 3: 366. 1789. *K. vaginata*

Lam. Ill. 1: 148. 1791. *Cyperus peruvianus* F. N. Williams, Bull. Herb. Boiss. II. 7: 90. 1907.

Brackish marshes along or near the seashore, Izabal. British Honduras to Panama and Colombia; West Indies; tropical Africa.

A glabrous perennial, the rhizomes often greatly elongate and thick; culms about 1 cm. apart, 30-60 cm. tall, 1 mm. thick at the apex, striate; leaves all reduced to sheaths, or rarely with a blade 1 cm. or less in length, the sheaths yellowish brown, coriaceous, with membranous margins; bracts 2-4, unequal, short; heads

globose, 6–10 mm. in diameter, with very numerous spikelets; scales unequal, the longer 3–3.5 mm. long, the shorter 2.5 mm. long, acuminate, the keel smooth; achene 1 mm. long, obovate, yellow or light brown, neither stipitate nor rostrate.

A plant confined to saline soil of coasts.

**Kyllinga pumila** Michx. Fl. Bor. Amer. 1: 28. 1803. *K. caespitosa* Nees in Mart. Fl. Bras. 2: 12. 1842. *Cyperus densicaespitosus* Mattf. & Kuekenh. Pflanzenreich IV. 20, pt. 2: 597. 1936. Figure 30.

Marshes or bogs, often in moist thickets or forest, in sandy or gravelly places along streams, or sometimes in cultivated ground, common in many localities, chiefly at low elevations, but ascending to about 1800 meters; Petén; Alta Verapaz; Izabal; Zacapa; Chiquimula; El Progreso; Santa Rosa; Escuintla; Sacatepéquez; Suchitepéquez; Retalhuleu; Sololá; Quezaltenango; San Marcos; Huehuetenango. United States to Mexico, British Honduras, and Panama, south to Argentina; Old World.

Plants annual, the culms densely cespitose, 5–40 cm. tall, 0.5 mm. thick at the apex; leaves 2–3 to a culm, about 2 mm. wide, usually shorter than the culm, scaberulous on the margins, the sheaths reddish brown; bracts 3–4, unequal, similar to the leaves; heads 4–8 mm. long and 3–4 mm. wide, mostly solitary, globose; spikelets 1.5–2 mm. long, very numerous, appressed; scales unequal, one 2 mm. long, the other 1.5 mm. long, scaberulous on the keel, pale green or brownish; achene 1 mm. long, oblong, yellowish brown, puncticulate, short-stipitate.

Collections of this and of *K. brevifolia* from Guatemala have been referred to *K. odorata* Vahl.

**Kyllinga pungens** Link, Hort. Berol. 1: 326. 1827.

Reported from Guatemala (Standley, Field Mus. Bot. 8: 243. 1931), probably from Izabal. A species of seashores, extending to Panama, West Indies, and South America; also in Africa and Asia.

Perennial, with short scaly rhizomes, the culms usually erect and stout, 30–80 cm. tall; basal leaves much shorter than the culm, 3–4 mm. wide, acute; bracts 2–4 and 6 cm. long or less; head solitary, globose or short-cylindric, 1 cm. thick; spikelets lanceolate, greenish; inner scale boat-shaped, carinate, 3-nerved on each side.

### LIPOCARPHA R. Brown

Low annuals, the culms slender, cespitose, leafy at the base; spikelets terete, many-flowered, in a terminal head or umbel subtended by an involucre of 1 to several bracts; scales firm, spirally imbricate, all fertile or a few of the lowest ones empty, at length deciduous; flowers perfect, with a small hyaline scale on each side; bristles none; stamens 1–2; style 2–3-cleft, deciduous, its base not enlarged; achene plano-convex or trigonous.

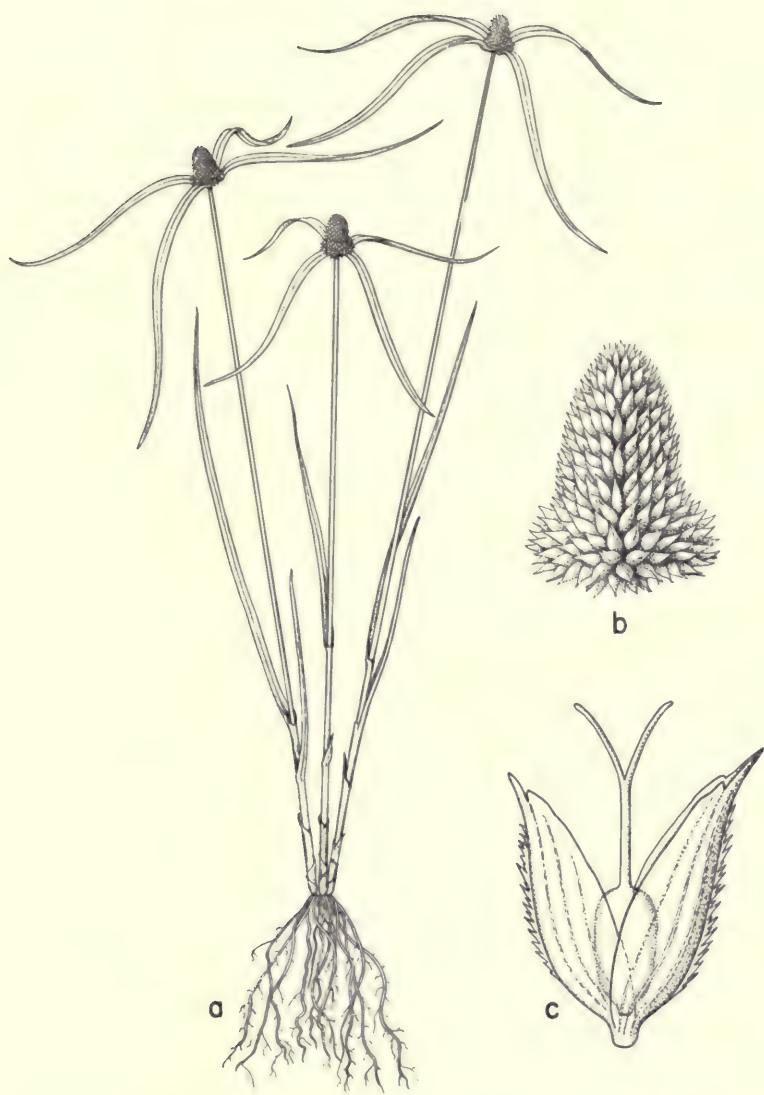


FIG. 30. *Kyllinga pumila*. a, Habit ( $\times \frac{1}{2}$ ). b, Head of spikelets ( $\times 4$ ). c, Flower ( $\times 14$ ).



About 14 species in tropical and warm regions of both hemispheres. One other species occurs in Panama and Mexico.

**Lipocarpa maculata** (Michx.) Torr. Ann. Lyc. N. Y. 3: 288. 1836. *Kyllinga maculata* Michx. Fl. Bor. Amer. 1: 29. 1803. *L. sphacelata* Kunth, Enum. Pl. 2: 267. 1837.

Wet fields or in ditches, ranging from sea level to about 1000 meters; Jalapa; Jutiapa; Suchitepéquez; Retalhuleu; San Marcos. Southern United States to Mexico and Panama; West Indies and South America.

Plants glabrous, with numerous slender roots, the culms densely tufted, smooth, striate, 10–25 cm. tall; leaves 5–15 cm. long, 1 mm. wide, much shorter than the culms, the sheaths purplish brown; bracts of the involucre 2–3, short or elongate; spikelets usually 2–6, sessile at the apex of the culm, 5–8 mm. long, ovoid or oblong-ovoid, terete, obtuse; glumes about 1.5 mm. long, obcuneate to lanceolate, thin, acute, mottled with purplish or brownish; perianth of 2 glumelike hyaline scales enfolding and longer than the achene; stamen 1; achene 1 mm. long, oblong-oblancheolate, light brown, puncticulate, apiculate at the apex, spongy-torulose at the base.

### RHYNCHOSPORA Vahl

*Reference:* G. Kuekenthal, Vor. Mon. Rhynchosporidae, Bot. Jahrb. 74: 375–509. 1949; 75: 90–126, 127–195. 1950; 75: 274–314. 1951.

Plants chiefly perennial and with rootstocks, sometimes annual, the culms leafy, trigonous or terete, the leaves linear, flat or involute; spikelets ovoid to oblong or fusiform, variously arranged; scales thin, 1-nerved, spirally imbricate, usually mucronate, the lowest ones empty, the upper flowers imperfect, the lower ones perfect; perianth of 1–20 (usually 6) bristles, wanting in some species; stamens usually 3; style 2-cleft, bidentate, or rarely entire; achene lenticular or turgid, not trigonous, smooth or transversely rugulose, capped by the persistent base of the style (tubercle), or sometimes by the whole style.

About 200 species of general distribution, most numerous in tropical regions. A few additional species are known in southern Central America.

Spikelets all crowded in a single dense large head, 1 cm. or more in diameter.

Bracts 10–30 cm. long; leaves 8–15 mm. wide. . . . . *R. cephalotes*

Bracts 4 cm. long or less; leaves 3 mm. wide or narrower.

Heads of 2–8 spikelets; bracts of inflorescence scalelike, inconspicuous.

*R. curvula*

Heads of many spikelets; at least one of bracts of inflorescence prolonged and longer than the head.

Plants glabrous; bracts not ciliate. . . . . *R. globosa*

Plants pubescent; bracts ciliate. . . . . *R. barbata*

Spikelets variously arranged but never in a single head, or if subcapitate, the head much less than 1 cm. in diameter.

Spikelets in globose heads. . . . . *R. cyperoides*

Spikelets not in globose heads.

Branches of the style short or none, much shorter than the undivided portion.

Inflorescence composed of individual pyramidal panicles, the spikelets mostly alternate; rachilla between the flowers conspicuously produced, often flexuous.

Scales fuscous or rufous-brown.

Culms stout throughout; spikelets mostly 6–12 mm. long, 1–2 (rarely 3) flowers of a spikelet achene-bearing; achene 2 mm. long.

*R. aristata*

Culms slender at the apex; spikelets 4–5 mm. long, 3–4 flowers of a spikelet achene-bearing; achene 1 mm. long. . . . . *R. vulcani*

Scales whitish-stramineous or brownish.

Scales brownish; spikelets 2–4 fasciculately clustered; inflorescence mostly broader than long, broadly triangular or pyramidal; cauline leaves few, remote; bristles 4–6, equaling or longer than the achene. . . . . *R. dives*

Scales whitish-stramineous; spikelets mostly solitary, alternate; inflorescence elongated, as long as or longer than broad; cauline leaves numerous, approximate; bristles few, minute or evanescent.

Spikelets 6–7.5 mm. long; beak elongated-pyramidal, mostly longer than the achene; achene 1.5 mm. long. . . . . *R. Tuerckheimii*

Spikelets 4–5.5 mm. long; beak broadly pyramidal, about half the length of the achene; achene 0.75–1 mm. long. . . . . *R. polyphylla*

Inflorescence composed of 2–5 corymbs with fasciculate spikelets; rachilla between the flowers short, straight.

Beak deeply sulcate on both sides, scarcely exceeding the subtending scale, nearly or quite as broad as the achene; achene finely punctulate. . . . . *R. corymbosa*

Beak scarcely or not at all sulcate, exserted from the subtending scale, much narrower than the achene; achene strongly transversely undulate-rugose. . . . . *R. triflora*

Branches of the style equaling or longer than the undivided portion.

Bristles present.

Achene smooth or faintly reticulate. . . . . *R. fascicularis*

Achene transversely undulate-rugose.

Tubercle deltoid-attenuate, well exceeded by the bristles; achene with the transverse rugulosities and fine striae blurred to often nearly smooth. . . . . *R. Marisculus*

Tubercle deltoid, shorter than to barely equaling the bristles; achene corrugate. . . . . *R. rugosa*

Bristles none.

Spikelets only 1–1.5 mm. long. . . . . *R. micrantha*

Spikelets 2.5–10 mm. long.

Achenes reticulate or smooth.

Culms and leaves pilose with spreading hairs; achenes reticulate.

*R. hirsuta*

- Culms and leaves glabrous or practically so; achenes smooth or minutely longitudinally striate-reticulate. . . . . *R. divergens*
- Achenes transversely rugulose.
- Achenes 3 or more in each spikelet.
- Bracts, bractlets, and glumes glabrous; style base depressed and almost discoid; glumes very acute. . . . . *R. eximia*
- Bracts, bractlets, and lower glumes pilose; style base pyramidal; glumes obtuse. . . . . *R. robusta*
- Achenes 1-2 in each spikelet.
- Scales whitish; spikelets only 2-5 on each culm. . . . . *R. pusilla*
- Scales brownish to fuscous; spikelets usually numerous.
- Achene tridentate at the apex. . . . . *R. setacea*
- Achene not tridentate.
- Glumes almost black; achene faintly rugulose, the tubercle longer than broad. . . . . *R. Kunthii*
- Glumes pale brown; achene strongly rugose, the tubercle short, broader than long. . . . . *R. tenuis*

**Rhynchospora aristata** Boeckl. Flora 40: 36. 1857, and Linnaea 37: 639. 1873.

Wet forests, damp thickets, and wet banks, frequently in cloud forests, 1320-3700 meters; Alta Verapaz; Jalapa; El Progreso; Chimaltenango; Sololá; Quezaltenango; Huehuetenango. Mexico; Honduras; Costa Rica; Panama; West Indies; South America.

Plants tall and stout, glabrous or nearly so, 4-9 dm. tall, with leafy culms and short thick rhizomes; leaves flat, 5-22 mm. wide, smooth or slightly scaberulous; spikelets very numerous, in large elongate panicles, mostly solitary and pedicellate, oblong-lanceolate and acuminate, 6-13 mm. long or even longer, 2-3-flowered; scales brownish-rufescent, mucronate-aristate; bristles 4-5, soon deciduous, shorter or slightly longer than the achene, this obovate or broadly ovate, biconvex, smooth or cancellate, stramineous or dark brown, with an elongate conic-subulate beak.

This species has sometimes been confused with *R. macrochaeta* Steud., a South American species with closely crowded spikelets on obliquely ascending branches of the inflorescence.

**Rhynchospora barbata** (Vahl) Kunth, Enum. Pl. 2: 290. 1837. *Schoenus barbatus* Vahl, Eclog. Amer. 2: 4. 1798.

Open pine forest of the Oriente, 800-1500 meters; Chiquimula; Jalapa; Jutiapa. British Honduras to Panama; northern South America.

A densely cespitose perennial, forming small tufts, the slender culms naked, 15-40 cm. tall, glabrous or sometimes pilose above; leaves usually half as long as the culms or shorter, 1-2 mm. wide, pilose with spreading hairs; flower head one, globose and subechinate, about 0.5-1.5 cm. in diameter, brown, the basal bracts



usually equaling or shorter than the heads, sometimes longer; scales glabrous, indurate and lustrous; bristles twice as long as the achene; achene broadly winged.

**Rhynchospora cephalotes** (L.) Vahl, Enum. Pl. 2: 237. 1806.  
*Scirpus cephalotes* L. Sp. Pl. ed. 2. 76. 1762. *Navajuela*.

Savannas or hilly pine forest of the Atlantic lowlands; Petén; Alta Verapaz; Izabal. Southern Mexico and British Honduras to Panama; Jamaica; South America.

Plants large and coarse, often a meter high or more, with rhizomes, often forming dense clumps, the culms leafy; leaves flat, 50 cm. long or less, 4–12 mm. wide, with very rough margins; inflorescence consisting of a single ovoid head of greenish spikelets, 2–4 cm. long, subtended by large leaflike bracts; spikelets about 7 mm. long; bristles 6, longer than the achene; achene 1.5 mm. long, reticulate, castaneous, the slender beak longer than the body.

The coarse sawlike edges of the leaves can cut the flesh easily. The plant is particularly plentiful on the hills above Quiriguá hospital.

**Rhynchospora corymbosa** (L.) Britton, Trans. N. Y. Acad. Sci. 11: 85. 1892. *Scirpus corymbosus* L. Amoen. Acad. 4: 303. 1788.  
*R. aurea* Vahl, Enum. Pl. 2: 229. 1806.

Marshes or moist thickets or forest, ascending from sea level to about 1380 meters; Alta Verapaz; Izabal. Southern Mexico to Panama; West Indies; South America; widely dispersed in tropical regions of both hemispheres.

Plants tall and coarse, glabrous or nearly so, the culms trigonous, often 1 meter high or more, the rhizomes short and thick or none; leaves equaling the culm, 30–60 cm. long and 0.8–1.5 cm. wide, with rough margins; bracts of inflorescence foliaceous; inflorescence large, often 40 cm. long, corymbose-paniculate, the branches at length divaricate, the spikelets 6–8 mm. long, clustered in fascicles of 2–5, usually 2–3-flowered, but maturing a single achene; scales fuscous-ferruginous or dark brown, ovate, obtuse, mucronate; bristles 6, ferruginous, longer than the achene; achene oblong-obovate, 2–3 mm. long, brown or castaneous, shining, the tubercle long-conic, sulcate on each side, equaling the body of the achene.

**Rhynchospora curvula** Griseb. Fl. Brit. W. Ind. 574. 1864.  
*R. scapigera* Boeckl. Linnaea 38: 402. 1874.

Collected in open pine woods, near Jenkins Creek, Toledo District, British Honduras, and probably extending into the savannas of Petén and Izabal. West Indies; northern South America.

Densely caespitose perennial, the culms several or many, 4–15 cm. tall, filiform, trigonous, sulcate, glabrous; leaves basal, rigid, recurved, much shorter than the culm, 1.5–4 cm. long, 1–2 mm. wide, carinate, glabrous; sheaths brown; inflorescence terminal, of 2–8-congested spikelets; bracts short, scalelike; spikelets sessile,

linear-lanceolate, 6–7 mm. long, 2-flowered; scales 6–7, gray-brown, margins white-hyaline, the lower ovate, the upper longer, ovate-lanceolate; bristles 5, rigid, ferruginous, equaling or longer than the achene, plumose-ciliate for two-thirds of their length, antrorsely scabrid at the apex; achene obovate-oblong, biconvex, brown or blackish, white-margined, minutely punctulate.

**Rhynchospora cyperoides** (Swartz) Mart. Denkschr. Akad. Wiss. Muenchen 6: 149. 1816–17. *Schoenus cyperoides* Swartz, Prodr. Veg. Ind. Occ. 19. 1788. *Tule*.

Wet meadows or savannas or along swamp and lake margins, often in oak forest, at 1700 meters or less; Petén; Alta Verapaz; Izabal; Jalapa; Jutiapa; Huehuetenango. Southern Mexico to Panama and South America; West Indies; tropical Africa.

Plants perennial, glabrous or nearly so, with short thick rhizomes, the slender or rather stout culms 30–80 cm. tall; leaves longer or shorter than the culms, 2–5 mm. wide; spikelets collected in few or numerous globose and somewhat echinate, dark brown, openly paniculate heads 8–12 mm. in diameter; spikelets containing a single achene, with about 7 scales; bristles 6, slightly shorter than the achene; achene obovoid, narrowed at the base, 1 mm. long, brownish, smooth or transversely rugulose, the beak subulate, ciliate, equaling the achene.

**Rhynchospora divergens** Curtis, Amer. Jour. Sci. II. 7: 409. 1849.

Collected near Honey Camp, British Honduras (*W. C. Meyer 106*), and probably extending into Petén. Florida; West Indies.

Plants glabrous or nearly so, erect, the culms densely cespitose and forming small clumps, very slender, 20–45 cm. tall, wiry, the rhizomes short and thick; leaves 20 cm. long or less, shorter than the culms, setaceous, canaliculate, scarcely 2 mm. wide; spikelets corymbose, the corymbs usually dense and often almost headlike, 1–2 cm. broad; spikelets 2–3-fasciculate, 2–3 mm. long, dark brown, containing 1–2 achenes; scales ovate, subobtuse; stamens 1–2; bristles none; achene 0.5 mm. long, pale or stramineous, obovoid, sessile, smooth, the beak very short and bulblike.

**Rhynchospora dives** Standl. in Yuncker, Field Mus. Bot. 17: 315. 1938. *R. orizabensis* C. B. Clarke ex Britton, Trans. N. Y. Acad. Sci. 11: 85. 1892, *nomen nudum*; Kuekenenthal, Bot. Jahrb. 74: 406–407. 1949, with description.

Moist banks, generally in barrancos of the Pacific *boca costa* and the lower slopes of volcanoes, 750–1500 meters; Suchitepéquez; Quezaltenango; San Marcos.

Usually coarse, stout, but sometimes more slender perennial, glabrous or nearly so, the culms 0.65–1 meter high, acutely triquetrous, smooth, leafy, especially near base; leaves elongated, 3–9 mm. wide, generally smooth except for the scabrid mid-

rib and margins; inflorescence corymbose-paniculate, mostly broader than long, the axillary panicles on slender divergent peduncles, 1–3 cm. long; branchlets subtending spikelets capillary; spikelets rather crowded, 2–4-flowered, mostly 2–4-fasciculate, linear-lanceolate, 5 mm. long, short-pedicellate; scales pale brown; bristles 4–6, equaling or exceeding the achene; achene subovate, biconvex, pale brown, lustrous, obscurely to prominently cancellate, the beak conic-subulate, one-half to two-thirds of the length of the achene.

**Rhynchospora eximia** (Nees) Boeckel. *Linnaea* 37: 601. 1873. *Spermodon eximius* Nees in Seem. Bot. Voy. Herald 222. 1854.

In wet spots on brushy plains, 800–1000 meters; Jutiapa. Mexico to Panama; Cuba; South America.

Plants glabrous, with fibrous roots, the slender or stout culms 7–45 cm. tall, often cespitose, leafy; leaves flat, shorter than or often exceeding the culms, 1–3 mm. wide; spikelets few or numerous, in small open corymbs, 7–10 mm. long, 3–8-flowered, usually long-pedicellate, dark brown; scales thin, ovate to lanceolate, acute, usually with hyaline margins; bristles none; achene yellow-brown, orbicular-obovate, 1–1.25 mm. long, transversely rugulose, with a very short, depressed tubercle.

**Rhynchospora fascicularis** (Michx.) Vahl, Enum. 2: 234. 1806. *Schoenus fascicularis* Michx. Fl. Bor. Am. 1: 37. 1803. *Schoenus distans* Michx. Fl. Bor. Am. 1: 36. 1803. *Rhynchospora distans* (Michx.) Vahl, Enum. 2: 235. 1806. *R. fascicularis* var. *distans* (Michx.) Chapm. Fl. So. U. S. 527. 1860.

Reported by Kuekenenthal from Guatemala. Collected in British Honduras without definite locality indicated (*H. P. Smart* 85), and in Stann Creek Valley, British Honduras (*Kinloch* 217). South-eastern and southern United States, from Virginia south along the coastal plain west to eastern Texas; Tabasco; West Indies; Venezuela and Dutch Guiana.

Plants erect, perennial, cespitose, the culms mostly slender, 0.4–1.3 meters tall; leaves curling to erect, flat to involute, shorter than the culms, 1–4 mm. wide; corymbs densely fasciculate; bracts several, mostly setaceous, exceeding the fascicles; spikelets narrowly ovoid, 3–4.5 mm. long, sessile, 2–4-flowered, containing 1–3 achenes; scales ovate to lanceolate, conspicuously mucronate to aristate, castaneous or dark brown; bristles 5–6, rudimentary and short (in var. *fascicularis*) to well developed and exceeding the achene (in var. *distans*), erect, antrorsely serrulate; achene ovate to elliptic, chestnut- to blackish-brown, smooth, 1.3–1.5 mm. long; tubercle deltoid to deltoid-subulate, one-third to one-half of the length of the achene.

The British Honduras specimens examined have the bristles longer than the achene and are therefore to be referred to var. *distans*. However, considerable variation is encountered in the character of the relative length of the bristle with respect to the achene.



**Rhynchospora globosa** (HBK.) Roem. & Schult. Syst. Veg. 2: 89. 1817. *Chaetospora globosa* HBK. Nov. Gen. & Sp. 1: 230. 1815. ?*R. epiglobosa* Clarke, Kew Bull. Add. Ser. 8: 34. 1908 (type from British Honduras).

Common on savannas near Cristina, Izabal, 70 meters; Petén. Oaxaca to British Honduras; Costa Rica; Panama; Cuba; South America.

Plants glabrous or nearly so, densely cespitose from stout hard rhizomes, the culms 30–90 cm. tall, slender but stiff and wiry; leaves basal, 15–50 cm. long, 5 mm. wide or less, erect, stiff and rigid, blackish brown and indurate at the base; heads terminal, solitary, subglobose, 1–2 cm. long, one of the bracts longer than the head and erect, the others shorter; spikelets brownish, the scales indurate and lustrous, mucronate; bristles about 6; achene fuscous, with a short beak.

**Rhynchospora hirsuta** Vahl, Enum. Pl. 2: 231. 1806. *Schoenus hirsutus* Vahl, Eclog. Amer. 1: 6. 1796.

Collected at All Pines (*Schipp 676*) and at Belize (*Bartlett 11254*), British Honduras, and to be expected in the savannas of Petén and Izabal. Reported from Panama; West Indies; northern South America.

Plants erect, usually densely cespitose, with fibrous roots, 10–40 cm. tall, usually densely pilose almost throughout, sometimes glabrate, the culms slender, leafy; leaves equaling or shorter than the culms, erect, 1–2 mm. wide, flat; corymbs 2–4 cm. high, few or several and forming a narrow elongate panicle; spikelets numerous, 3–4 mm. long, 2–4-fasciculate, brown or castaneous, the scales broadly ovate, obtuse, with hyaline margins, the lower ones with a pilose midrib; bristles none; achene yellow-brown, 0.5 mm. long, coarsely undulate-rugulose, lustrous, whitish or lead-colored.

**Rhynchospora Kunthii** Nees, Linnaea 9: 297. 1834, *nomen nudum*; in Mart. Fl. Bras. 2, pt. 1: 147. 1842.

Wet meadows, 2200–3150 meters; Huehuetenango; San Marcos (Volcán de Tacaná). Mexico; Brazil and probably elsewhere in South America.

Plants perennial, glabrous or nearly so, from short thick rhizomes, the culms slender or rather stout, 15–60 cm. tall, leafy, trigonous; leaves shorter than the culms, 2–3 mm. wide, pale, flat, rough-margined; spikelets few or numerous, arranged in a few dense and almost headlike corymbs; spikelets sessile or nearly so, blackish, 3–4 mm. long, containing usually 2 achenes; bristles shorter than the achene, this yellowish, obovoid, transversely rugulose, the beak conic, acute.

**Rhynchospora Marisculus** Nees, Linnaea 9: 297. 1834.

Marshes and bogs, sometimes in pine forest, near sea level and ascending to 1500 meters; Izabal; Alta Verapaz; Chiquimula;

Huehuetenango. Southern Mexico; Costa Rica; West Indies and South America.

Plants erect, perennial, glabrous or nearly so, a meter high or usually lower, with short rhizomes, the culms leafy, slender; leaves 20–40 cm. long, 4–7 mm. wide, rigid, pale when dried; corymbs lax, forming a small panicle, the peduncles erect or recurved; spikelets brown, 5–7 mm. long, approximate and subfasciculate, containing 1–2 achenes; scales ovate-lanceolate, acuminate, loosely overlapping; bristles 6–7, much longer than the achene; achene short-stipitate, obovoid, transversely rugulose, 1.4–1.6 mm. long, 1–1.2 mm. wide, the beak triangular-attenuate, 1.2–1.8 mm. long, about equaling the achene.

**Rhynchospora micrantha** Vahl, Enum. Pl. 2: 231. 1806.

Wet meadows or along small streams, sometimes in oak forest, 400–1400 meters; Zacapa; Chiquimula; Jalapa; Jutiapa; reported from Suchitepéquez. Southern Mexico to British Honduras and Panama; widely dispersed in tropical America; western Africa.

Plants annual, with fibrous roots, very slender, 10–50 cm. high, the culms leafy, glabrous, weak; leaves shorter than the culm, 1–3 mm. wide; corymbs several, small, lax, with almost filiform spreading branches; spikelets numerous, greenish, 1–2 mm. long, containing a single achene; scales ovate-lanceolate, acute; bristles none; achene minute, 0.5–0.75 mm. long, obovoid, yellowish-brown, transversely rugulose, bearing a depressed tubercle.

**Rhynchospora polyphylla** Vahl, Enum. Pl. 2: 230. 1806.

*Schoenus polyphyllus* Vahl, Eclog. Amer. 2: 5. 1798.

Wet or moist forest or thickets, often in ravines or along streams, sometimes in pine forest, 250–1500 meters; Alta Verapaz; Zacapa; Chiquimula; reported from Santa Rosa; Retalhuleu; Huehuetenango. Southern Mexico to Panama; West Indies and northern South America.

Plants perennial, glabrous or pubescent, with slender rhizomes, the culms very leafy, often a meter long, weak and frequently reclining; leaves mostly equaling the culms, often very numerous, 3–8 mm. wide, the margins usually rough, glabrous or sparsely pilose; panicles 4–7, small or elongate, narrow, axillary and often very dense; spikelets pale, very numerous, 4–5.5 mm. long, the scales ovate-lanceolate, pale or stramineous; bristles few, almost obsolete; achene 0.75–1 mm. long, obovoid-globose, castaneous, shining, cancellate, the beak broadly pyramidal, about one-half the length of the achene.

**Rhynchospora pusilla** (Swartz) Griseb. in Götting. Abh. 7: 271.

1857. *Schoenus pusillus* Sw. Prodr. 20. 1788; Fl. Ind. Occ. 7, t. 6. 1797. *Hypolytrum Berterii* Spreng. Neue Entd. 1: 241. 1820. *Rhynchospora Berterii* (Spreng.) Clarke in Urban, Symb. Antill. 2: 119. 1900.

Collected at Honey Camp, British Honduras, and to be expected in nearby Petén. Greater Antilles.

A small slender perennial with very slender rootstocks and short stolons; culms weak, almost filiform, 2–10 cm. long, glabrous; leaves often exceeding the culms, 1 mm. wide or less, glabrous, or the sheaths pilose; spikelets borne at the apex of the culms, usually 2–6 in a cluster, pale green or whitish, lanceolate, 2–4 mm. long, containing 1–2 achenes; scales lanceolate, acute; bristles none; achene rounded-obovoid, brown, 1 mm. long, transversely rugulose, the tubercle low-conic.

**Rhynchospora robusta** (Kunth) Boeckel. *Linnaea* 37: 616. 1873. *Dichromena robusta* Kunth, *Enum. Pl.* 2: 283. 1837.

Bogs or wet savannas, at 1350 meters or less; Alta Verapaz; Izabal. Southern Mexico to Panama; South America.

Plants 60–100 cm. tall, with short rhizomes, the culms rather stout, leafy, glabrous, smooth; leaves few, 3–5, shorter than the culms, 5–8 mm. wide, rather rigid, glabrous or especially the midrib and margins ciliate; corymbs large and broad, with elongate rays, the bracts and bractlets pilose, the spikelets clustered at the ends of the rays, few or usually numerous, 7–10 mm. long, brown, the scales rather thin, densely imbricate, often with scarious margins, tipped by a short or elongate mucro, the lower with pubescent mucro; bristles none; achene biconvex, suborbicular, 1.5 mm. long, pale or yellowish-brown, lustrous, transversely rugulose, bearing a rather short, conic, deeply bilobed tubercle about three-fourths the length of the achene.

The collection of *Seler 2401* from Cobán, Alta Verapaz, was reported by Loesener as *R. velutina* var. *semihirsuta* (Boeckel.) Clarke (= *R. semihirsuta* Boeckel.). This collection, deposited in the Gray Herbarium, has been identified by the present authors as *R. robusta*.

**Rhynchospora rugosa** (Vahl) Gale, *Contr. Gray Herb.* 151: 275. 1944. *Schoenus rugosus* Vahl, *Eclog. Amer.* 2: 5. 1798. *R. glauca* Vahl, *Enum. Pl.* 2: 233. 1806.

Usually in pine-oak forest, sometimes on open grassy banks, or in alpine meadows, ascending from near sea level to about 3100 meters; Alta Verapaz; Izabal; El Progreso; Jalapa; Huehuetenango. Southern Mexico to Panama; widely dispersed in the tropics of both hemispheres.

Plants erect, perennial, glabrous or nearly so, the culms slender or rather stout, 20–80 cm. tall, the rhizomes short and stout; leaves 50 cm. long or less, usually shorter than the culms, 1.5–3 mm. wide; corymbs few, distant, lax, mostly 1–3 cm. broad; spikelets ovoid, 3 mm. long, brown or dark brown, containing 1–2 achenes; scales ovate, acuminate; bristles about 6, upwardly barbellate, as long as the achene; achene castaneous, obovoid, 1.5 mm. long, transversely rugulose, the tubercle conic, acute, one-third to one-half as long as the achene.



***Rhynchospora setacea*** (Berg) Boeckl. Vid. Medd. Kjoebenhavn 1869: 159. 1870. *Schoenus setaceus* Berg, Act. Helv. 7: 130. pl. 9. 1772.

Wet savannas or wet slopes in pine forest, 1500 meters or less; Alta Verapaz; Izabal; Chiquimula. Panama; West Indies and South America.

Plants annual or perennial, usually cespitose, with fibrous roots, glabrous, the culms erect, slender, 5–50 cm. tall; leaves mostly shorter than the culms, 1–1.5 mm. wide, stiff; corymbs several, small, distant; spikelets 2–3-fasciculate, brown or brownish, narrowly lanceolate, 4–5 mm. long, containing 1–2 achenes; scales ovate-lanceolate, acute or mucronate; bristles none; achene obovoid, 1–1.5 mm. long, biconvex, 3-dentate at the apex, transversely rugulose, obconic-stipitate, the tubercle conic, forming the central one of the three apical teeth.

***Rhynchospora tenuis*** Link, Jahrb. 3: 76. 1820.

Marshes, wet meadows, or moist banks, most often in pine forest, 1000–2000 meters; Jalapa; Guatemala; Quiché; Huehuetenango. Mexico to Honduras; West Indies and South America. Figure 31.

Plants perennial, erect and rather stiff, with short slender rhizomes; culms cespitose, very slender, 10–40 cm. tall, glabrous; leaves equaling or shorter than

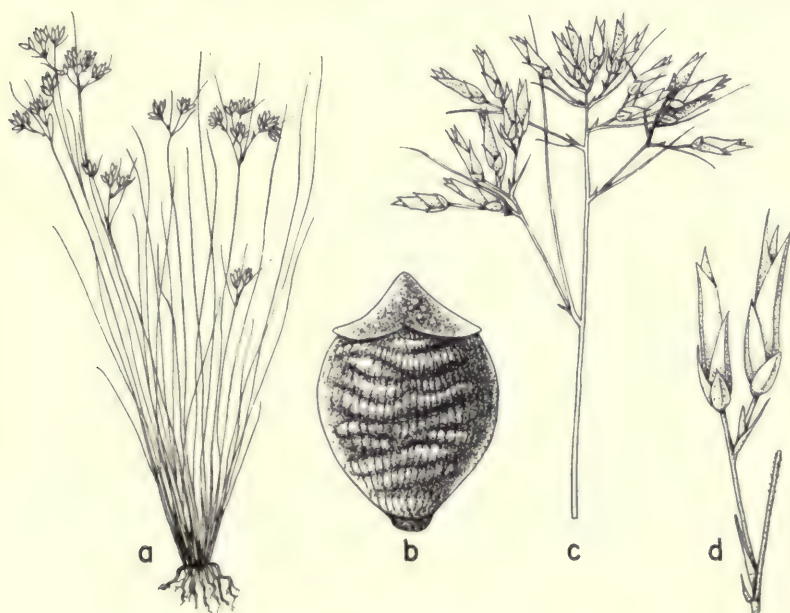


FIG. 31. *Rhynchospora tenuis*. a, Habit ( $\times \frac{1}{2}$ ). b, Achene ( $\times 35$ ). c, Inflorescence ( $\times 2$ ). d, Two spikelets ( $\times 6$ ).

the culms, mostly basal, 1–3 mm. wide; corymbs 1–3, axillary and terminal, the spikelets rather loosely fasciculate, numerous, pale, 3–4 mm. long, narrowly lanceolate, acute, containing a single achene; scales lanceolate or ovate, acute; bristles none; achene obovate or suborbicular, sessile, brownish, transversely rugulose, about 1 mm. long; tubercle acute, one-fourth to one-half as long as the achene and decurrent on its margins.

**Rhynchospora triflora** Vahl, Enum. Pl. 2: 231. 1806.

Wet savannas near Cristina, Izabal, 70 meters, *Steyermark 38430*. West Indies; South America; Old World tropics.

Plants coarse and stout, 7–9 dm. tall, the culms smooth or scabrid above; leaves often greatly elongate, mostly 4–8.5 mm. wide, rather stiff and coriaceous, rough-margined; spikelets slender-fusiform, forming diffuse panicles, mostly 3–7-fasciculate at the tips of long naked branches 6–8 mm. long, subsessile or shortly pedicellate, 2–4-flowered; scales ovate, mucronate, castaneous or ferruginous; bristles 6, longer than the achene, this obovate or broadly elliptic, biconvex, 3 mm. long, bearing a subulate tubercle much narrower and somewhat longer than its length.

Plants pertaining to this species have sometimes been identified as *R. inundata* Fern.

**Rhynchospora Tuerckheimii** C. B. Clarke, Trans. N. Y. Acad. Sci. 11: 85. 1892, *nomen nudum*; Kuekenenthal, Bot. Jahrb. 74: 403. 1949, with description. *Paja blanca*; *Lechuga*; *Samracán* (Cobán, Quechí).

Moist forests, wet brushy banks, frequently in cloud forests, 900–2000 meters; Chiquimula; Alta Verapaz; Chimaltenango; Quiché; Huehuetenango; San Marcos. Honduras; Costa Rica.

Culms very leafy, erect to reclining or subscandent, 1–2.2 meters tall, conspicuously triangular, smooth; leaves elongated, distichous, 3.5–6 mm. long, the denticulate-scabrid margins often somewhat revolute, sheaths suffused with rose-red; panicles 3–7, pyramidal, distant, 2–5 cm. long; bracts foliaceous, exceeding the panicles; spikelets terete, 6–7.5 mm. long, 4–5-flowered; scales densely imbricate, stramineous-whitish; bristles few, whitish, quickly deciduous; achene broadly obovate, biconvex, 1.5–1.75 mm. long, pale brown, shining, conspicuously cancellate, the beak elongated-pyramidal, longer than the achene.

Near Barillas, in the department of Huehuetenango, this species is a common ground cover in forests of *Liquidambar* and *Pinus Ayacahuite*. It is often used as a thatch material for small dwellings.

**Rhynchospora vulcani** Boeckel. Linnaea 37: 638. 1873. *R. Hoffmanni* Boeckel. Linnaea 37: 637. 1873. *R. ecuadorensis* C. B. Clarke in Engl. Bot. Jahrb. 34, Beibl. 78: 5. 1904.

Forested slopes, 1500–3000 meters; Quezaltenango; Huehuetenango; San Marcos. Costa Rica, the type from Volcán de Barba; Ecuador.

Plants perennial, erect, glabrous or nearly so, with short, stout, descending rhizomes rooting at the nodes, the culms slender, cespitose, rigid, 3–6 dm. tall, leafy at the base; leaves 2–4 mm. wide, elongated, strict, often shorter than the culms, lower sheaths rufous-brown; panicles mostly 3–4, interrupted, distant, the lateral long-pedunculate, the peduncles erect; foliaceous bracts exceeding the panicles; spikelets numerous, 3–4 mm. long, fuscous or castaneous, the scales ovate-lanceolate, acute; bristles 4–6, slightly exceeding the achene; achenes one in each spikelet, obovate, biconvex, about 1 mm. long, very pale brownish, shining, cancellate, the subulate-pyramidal pale beak shorter than the achene.

### SCIRPUS L.

*References:* Alan A. Beetle, Studies in the genus *Scirpus* L.: III. The American species of the section *Lacustres* Clarke, Amer. Journ. Bot. 28: 691–700. 1941; VI. The section *Schoenoplectus* Palla, op. cit. 30: 395–401. 1943; *Scirpus*, in N. Am. Fl. 18, 8: 481–504. 1947.

Plants usually perennial, slender or stout, the culms terete or angulate, leafy or the leaves all reduced to sheaths; spikelets terete or somewhat compressed, solitary, capitate, spicate, or umbellate, subtended by an involucre of one or several bracts, or the involucre wanting; scales spirally imbricate, all fertile or the lowest sometimes empty; flowers perfect; perianth of 1–6 bristles, sometimes absent; stamens 2–3; style 2–3-cleft, not enlarged at the base, deciduous from the achene or its base persistent as a subulate tip; achenes trigonous, lenticular, or plano-convex.

About 150 species, distributed in almost all regions of the earth, mostly in very wet soil, often in shallow water. Only the following species have been found in Central America.

Spikelet usually one on each culm; culms slender or capillary, 0.5 mm. thick or less.

Plants aquatic, submersed; spikelet containing a single achene . . . *S. confervoides*

Plants not aquatic, growing in moist meadows; spikelets containing several achenes . . . *S. inundatus*

Spikelets several to many on each culm, rarely one; culms mostly 2–10 mm. thick or thicker.

Bracts several, leaflike; perianth bristles none . . . *S. cubensis*

Bract one, appearing like a continuation of the culm; perianth bristles present.

Culms terete; spikelets in numerous heads on each culm.

Bristles retrorse-scabrous . . . *S. validus*

Bristles plumose . . . *S. californicus*

Culms acutely 3-angulate; spikelets usually collected in a single head.

Spikelets acute or at least pointed at the apex . . . *S. americanus*

Spikelets very obtuse at the apex . . . *S. chilensis*



**Scirpus americanus** Pers. Syn. Pl. 1: 68. 1805. *S. americanus* var. *longispicatus* Britton, Trans. N. Y. Acad. Sci. 11: 78. 1892.

In mud around springs or small streams, about 200 meters; Zacapa (Agua Caliente, between La Fragua and Río Motagua, *Steyermark 29221*). Widely distributed in North and South America; in Central America known only from Guatemala; New Zealand; Tasmania.

Plants perennial, from elongate rhizomes or stolons, the culms erect, a meter high or often lower, trigonous, smooth, green, with 3 or fewer sheaths at the base, these bearing blades 20 cm. long or shorter; involucre bract one, erect, green, 1.5–12 cm. long, trigonous, scabrous on the angles; spikelets reddish, sessile, generally 2–5, sometimes only one, sessile, 5–20 mm. long, 4 mm. broad, acute or pointed; scales 4 mm. long, the prominent costa excurrent from the retuse apex; style bifid; anther 1.5 mm. long; bristles 4, often tortuous, reddish brown, equaling the achene or only half as long, retrorse-barbate; achene dark brown, apiculate, plano-convex, smooth, 3 mm. long, 2 mm. broad.

The single Guatemalan collection has been determined by Beetle. It is referable to var. *longispicatus*. The Maya name (Yucatan) is "halal."

**Scirpus californicus** (C. A. Mey.) Steud. Nom. Bot. ed. 2. 2: 538. 1841. *Elytrospermum californicum* C. A. Mey. Mém. Acad. St. Pétersb. Sav. Etrang. 1: 201. pl. 2. 1830.

In shallow water of lake shores, ranging from sea level to about 1700 meters; Alta Verapaz; Izabal; Jalapa; Santa Rosa; Guatemala; Sololá. United States and Mexico; El Salvador; Costa Rica; South America; Hawaiian Islands.

Plants perennial by stout horizontal rhizomes; culms stout, often 2 meters high, subterete or obtusely trigonous, naked, spongy; leaves reduced to basal sheaths; involucre bract one, short, subulate, erect; umbel compound, appearing lateral, with numerous sessile or usually pedicellate spikelets; spikelets ovoid-oblong, 6–10 mm. long, acutish, the glumes ovate, brown, mucronate; bristles shorter than the achene or equaling it, short-plumose below, barbate above; style 2-cleft; achene obovate, plano-convex, almost white, short-rostrate, the surface cellular-reticulate.

The plant is particularly abundant at the edge of Lago de Amatitlán, where it forms dense colonies of wide extent. The tough soft stems are used for making mats and other similar articles.

**Scirpus chilensis** Nees & Mey. Linnaea 9: 293. 1834, *nomen*; Nees in Meyen, Act. Acad. Cur. 19: 93. 1843. *S. Olneyi* Gray, Bost. Journ. Nat. Hist. 5: 238. 1845.

In marshes or at the edge of water, 1300 meters or lower; Guatemala (Lago de Amatitlán, *Standley 61328*). United States and Mexico; British Honduras (Pueblo Nuevo); Costa Rica; West Indies; South America.

A glabrous perennial with rather thick, elongate rhizomes; culms 30–100 cm. high, acutely triquetrous, septate-nodulose, smooth, the sheaths brown or purple; bract one, erect, 1–3 cm. long; inflorescence a single head of 5–12 spikelets, appearing lateral; spikelets ovoid or oblong-ovoid, 5–10 mm. long, 2–3 mm. thick, very obtuse, 20–30-flowered; glumes oval to orbicular, brown, emarginate and mucronate, glabrous, ciliate; perianth bristles usually 6, retrorsely barbellate; style bifid; achene 2 mm. long, obovate-cuneate, plano-convex, dark grayish brown, apiculate, smooth, lustrous.

**Scirpus confervoides** Poir. in Lam. Encycl. 6: 755. 1804. *S. submersus* C. Wright in Sauv. Fl. Cub. 175. 1871. *Websteria submersa* Britton, Bull. Torrey Club 15: 99. 1888. *Eleocharis submersa* Miq. Linnaea 19: 225. 1847.

Chiquimula, in small waterhole bordering lake near Chiquimula, 500–1000 meters, *Steyermark 30721*. Florida; Cuba; South America; tropical Africa and Asia.

Plants aquatic, submersed, glabrous, with slender rhizomes, the culms filiform or capillary, usually 5–8 cm. long; leaves 5–8 cm. long, capillary; spikelets terminal, solitary, 8 mm. long, oblong-lanceolate, containing a single achene; lowest glumes as much as 8 mm. long, membranaceous, pale green; bristles 6–10, longer than the achene, retrorsely barbellate; achene obovoid, pale, smooth.

Apparently a rare plant, known in Central America from a single collection, which was determined by Dr. H. K. Svenson.

**Scirpus cubensis** Poepp. & Kunth, in Kunth, Enum. Pl. 2: 172. 1837.

In shallow water of swamps and marshes, sometimes growing in floating bogs, as at Lago de Izabal, at or near sea level, and ascending (Sacatepéquez; Huehuetenango) to 1500–1800 meters; Petén; Izabal; Jutiapa; Sacatepéquez (fide Hemsley); Huehuetenango. Mexico to Panama and Brazil; West Indies; tropical Africa. Figure 32.

A glabrous perennial with short rhizomes; culms often cespitose, 30–80 cm. tall, trigonous, smooth, rigid; leaves 10–50 cm. long, 2–10 mm. wide, flat, sometimes rough-margined, the sheaths brownish purple; bracts 4–7, similar to the leaves; rays of the umbel 5–8 and 6 cm. long or shorter, unequal; spikelets densely capitate, 4–8 mm. long, ovoid, obtuse, 6–12-flowered; scales broadly ovate, coriaceous, brown, mucronate; perianth none; style bifid; achene 2 mm. long, obovate-oblong, plano-convex, pale yellow, lustrous, very minutely cellular.

The Guatemalan material has been referred by Dr. Beetle to var. *gracilis* (Boeckl.) Beetle.



FIG. 32. *Scirpus cubensis* var. *gracilis*. a, Upper part of culm with flowers ( $\times \frac{1}{2}$ ). b, Flower and scale ( $\times 10$ ). c, Achene ( $\times 12$ ). d, Head of spikelets ( $\times 8$ ).

***Scirpus inundatus*** (R. Br.) Poir. in Lam. Encycl. Suppl. 5: 103. 1817. *Isolepis inundata* R. Br. Prodr. 222. 1810.

Wet meadows along brooks, 2500 meters; Huehuetenango (east of San Mateo Ixtatán, *Steyermark 49877a*). Costa Rica; western South America; Australia; New Zealand; Malaysia.

Plants low, perennial, densely cespitose, usually forming very dense clumps or mats; culms very slender but stiff, scarcely 0.5 mm. thick, mostly 5–13 cm. high, glabrous, pale green, striate-angulate; sheaths bladeless; bract one, erect, equaling or shorter than the spikelets; spikelets mostly solitary, sometimes several, or the inflorescence often proliferous in age and subumbellate; spikelets ovoid, obtuse or subacute, about 4 mm. long; scales ovate, obtuse, dark reddish brown or castaneous, not nerved; style bifid; achene somewhat lenticular, smooth.

The plant is common in the higher mountains of Costa Rica but apparently very rare in Guatemala.

***Scirpus validus*** Vahl, Enum. Pl. 2: 268. 1806.

Abundant in open swamps, about 1575 meters; Baja Verapaz (large swamp below Pantín, *Standley 90991*). Widely distributed



in North America; Mexico; West Indies; South America; eastern Asia; Australia; New Zealand.

Plants erect from slender rhizomes, the culms sometimes 2 meters high but usually lower, sometimes 2 cm. thick, terete; sheaths reddish or pale brown, with a stiff narrow blade 5 mm. long or sometimes as much as 10 cm.; bract of the inflorescence rigid, 1-7 cm. long; inflorescence usually much branched, the spikelets numerous, in clusters of 2-4 on scabrous-marginate pedicels; spikelets ovoid, few-many-flowered, 5-10 mm. long, 4-5 mm. broad; scales mucronate, the mucro often slightly recurved; bristles brick-red, usually 6, equaling the achene, retrorsely-scabrous, tortuous; style 2-fid; anther 2.2 mm. long; achene 2.5 mm. long, 2 mm. broad, deep gray when ripe, lenticular.

### SCLERIA Berg

*Reference:* Earl C. Core, The American species of *Scleria*, Brittonia 2: 1-105. 1936.

Annuals or perennials, low or tall and coarse, often with rhizomes, the culms leafy; flowers monoecious, the staminate and pistillate spikelets separated or borne in the same cluster; spikelets small, clustered in terminal or in terminal and axillary clusters, sometimes interruptedly spicate; fertile spikelets 1-flowered, the staminate many-flowered; scales spirally imbricate; perianth none; style 3-cleft, slender or sometimes enlarged at the base, deciduous; ovary supported by a disk (hypogynium), or this wanting; stamens 1-3; achene globose or ovoid, obtuse, crustaceous or osseous, white or colored, smooth or variously roughened.

A large genus of about 200 species, half of which are found in tropical and temperate America. A few species besides those listed below extend into Central America.

Hypogynium none; inflorescence often an interrupted spike.

Inflorescence branched.

Achene smooth.....*S. lithosperma*

Achene obscurely reticulate or verrucose-tuberculate.....*S. micrococca*

Inflorescence simple, spicate.

Achene reticulate or verrucose.

Bracts hirsute.....*S. interrupta*

Bracts glabrous.....*S. verticillata*

Achene smooth or practically so.

Plants annual.....*S. Lindleyana*

Plants perennial.

Inflorescence interruptedly glomerate-spicate; scales hirsute...*S. hirtella*

Inflorescence a single cluster of spikelets at the summit of the culm; scales glabrous.....*S. georgiana*

Hypogynium present and conspicuous at the base of the achene.

Hypogynium with ciliate, fimbriate, or serrate margins.

Margin of the hypogynium fimbriate or serrate.....*S. latifolia*

Margin of the hypogynium ciliate.

- Achene large, 3.5–6 mm. long. . . . . *S. macrophylla*  
 Achene only 1–3 mm. long.  
     Achenes 1–2 mm. long; leaves 7–11 mm. wide. . . . . *S. microcarpa*  
     Achenes 2–3 mm. long; leaves 10–50 cm. wide.  
         Style base black, usually persistent. . . . . *S. mitis*  
         Style base brown, early deciduous. . . . . *S. Eggersiana*
- Hypogynium trilobate, the margins entire, not ciliate.  
 Inflorescence paniculate, the upper part of the panicle bearing only staminate spikelets, the lower part bearing only pistillate spikelets. Achene pubescent. . . . . *S. bracteata*  
 Inflorescence with staminate and pistillate spikelets intermixed throughout.  
 Achene smooth.  
     Hypogynium with 9 small tubercles. . . . . *S. oligantha*  
     Hypogynium without tubercles.  
         Ligule at the summit of the leaf sheath bearing a conspicuous scarious appendage. . . . . *S. secans*  
         Ligule not appendaged.  
             Culms very slender, about 1 mm. thick at the apex. . . . . *S. anceps*  
             Culms stout, much thicker.  
                 Lobes of the hypogynium crenulate; achene white, 3–4 mm. long. *S. setuloso-ciliata*  
                 Lobes of the hypogynium entire; achene white or purplish, 1.5–2.5 mm. long.  
                     Achene white . . . . . *S. pterota*  
                     Achene purple or purplish. . . . . *S. pterota* var. *melaleuca*
- Achene verrucose, reticulate, or papillate.  
     Hypogynium not bearing tubercles.  
         Achene glabrous. . . . . *S. reticularis*  
         Achene pilose. . . . . *S. setacea*  
     Hypogynium bearing 3 tubercles.  
         Achenes 1.5 mm. long. . . . . *S. coriacea*  
         Achene 2–3 mm. long. . . . . *S. ciliata*

**Scleria anceps** Liebm. Vid. Selsk. Skrivt. V. 2: 257. 1850.

Moist thickets or pine-oak forest, 700–1600 meters; Jalapa; Huehuetenango. Veracruz.

Perennial, with rhizomes, the culms 30–50 cm. tall, very slender, the angles scaberulous or almost smooth; leaves few, 2 mm. wide, scabrous on the margins, the sheaths glabrous or nearly so, very narrowly winged; ligule short-ovate, brown, pilose; peduncles 1–3, terminal and axillary, few-flowered, the lateral ones capillary; bracts foliaceous, exceeding the inflorescence; spikelets 3–5 mm. long, the scales red-brown or purplish; hypogynium white, tinged with purple, trilobate, the lobes ovate, acute, the margin undulate; achene 2–3 mm. long, white, apiculate, ovoid, smooth and lustrous, glabrous.

***Scleria bracteata* Cav. Icon. 5: 34. pl. 457. 1799. *Navajuela*.**

Wet thickets or pine forest, ascending to 1450 meters; Alta Verapaz; Izabal. Southern Mexico and British Honduras to Panama, southward to Paraguay and Bolivia; West Indies.

A perennial with thick rhizomes, the culms erect and a meter high or scandent and 2-3 meters long or more, very leafy; leaves 15-45 cm. long, 6-18 mm. wide, flat, 3-nerved, rough on both surfaces, the margins serrulate-scabrous, tapering gradually from the base into a caudate tip, the sheaths purplish, hirsute; ligule 4 mm. long, ovate, obtuse, stiff, hirsute; inflorescence paniculate, the peduncles terminal and axillary, the upper staminate, the lower pistillate, dark purplish brown, the rachises scabrous-hirsute; bracts of the pistillate inflorescence 7 cm. long or less, leaflike; staminate spikelets several-flowered; pistillate spikelets with few or several flowers, the scales purple, acuminate; hypogynium 3-lobate, the lobes rounded, with dark purple margin, entire or sometimes dentate; achene white or tinged with purple, 2-3 mm. long, subglobose, verrucose or subtuberculate, pubescent.

Called "cutting-grass" and "saw-grass" in British Honduras. The plant is particularly abundant on the pine-clad hills around Cobán, where it often forms extensive and impenetrable tangles, frequently in association with *Gleichenia*. The sharp-edged leaves cut the skin and flesh almost like a sharp knife.

***Scleria ciliata* Michx. Fl. Bor. Amer. 2: 167. 1803.**

Reported by O'Neill from El Cayo District, British Honduras, and to be expected in Petén or Izabal. Southeastern United States; West Indies; Honduras.

Perennial, with a rather stout, nodose rhizome; culms 20-60 cm. tall, erect, tufted, rather stout to almost filiform, sharply triquetrous, pilose or almost glabrous; leaves 20-45 cm. long, 2-6 mm. wide, obtuse, ciliate, often much taller than the culms, the sheaths pubescent; ligule 2 mm. long or less; inflorescence terminal and axillary, few-flowered, the clusters often arising from the lower axils on short erect peduncles; bracts elongate, often conspicuously ciliate; staminate spikelets many-flowered, the scales purplish, lanceolate, pubescent, ciliate; hypogynium a narrow, obtusely 3-angulate border supporting 3 globose brownish tubercles; achene 2-3 mm. long, tuberculate, white, globose, fragile, usually mucronate-apiculate.

***Scleria coriacea* Liebm. Vid. Selsk. Skrivt. V. 2: 259. 1850.**

Zacapa, pine-covered slopes of Sierra de las Minas, 1000-1500 meters, *Steyermark 29684*. Also in Guanacaste, Costa Rica.

Plants perennial, from a thick hard rhizome, the slender culms 15-45 cm. tall, triquetrous, rough on the angles; leaves 25-30 cm. long or more, 2-4 mm. wide, rigid, erect, scabrous, the sheaths pubescent; ligule ovate, hirsute; inflorescence of 1-2 few-flowered glomerules, the lateral one remote, on a short erect peduncle;



bract foliaceous, erect, appearing like a continuation of the culm; bractlets pubescent, linear-lanceolate; spikelets 5 mm. long, few-flowered, the scales ovate, ferruginous, mucronate, ciliate; hypogynium triangular, bearing 3 bilobate whitish tubercles; achene transversely rugose-tuberculate, globose, white, 1–2 mm. long.

Perhaps ultimately to be reduced to synonymy with *S. ciliata*.

***Scleria Eggersiana* Boeckel. Cyp. Nov. 2: 41. 1890.**

Wet fields or thickets at or near sea level; Izabal; Petén. Panama; Surinam; West Indies.

Plants rather stout, erect, from thick rhizomes, the culms 1–2 meters tall, trigonous, almost smooth; leaves 30 cm. long or more, 1–2.5 cm. wide, scabrous, especially on the nerves and margins, coriaceous and rigid, somewhat plicate, the sheaths 3-winged, scabrous on the angles, otherwise glabrous; ligule lance-triangular, slightly pubescent, rigid, 2.5 mm. long or less; inflorescence paniculate, narrow, about 30 cm. long, its branches erect; bracts leaflike, the bractlets setaceous; pistillate scales suborbicular, ferruginous, mucronate; margin of the hypogynium densely brown-ciliate, 3-lobate; achene 2.5–3 mm. long, white, subglobose, smooth and lustrous, terminated by a conic style base.

***Scleria georgiana* Core, Brittonia 1: 243. 1934.**

Collected in British Honduras at several localities, and to be expected in adjacent Petén. Southeastern United States; Cuba and Jamaica.

Plants with thick horizontal rhizomes, the culms 30–50 cm. tall, slender, wiry, glabrous; leaves 12–16 cm. long or more, 1–2 mm. wide, glabrous, linear or filiform and resembling the culms; sheaths glabrous, the lower ones without blades; ligule none; inflorescence a single terminal fascicle of 2–5 spikelets, the lowest bract 1–8 cm. long and 1–2 mm. wide, appearing like a continuation of the culm; spikelets 5 mm. long, the bractlets lanceolate, glabrous; scales red-brown, glabrous, acuminate; hypogynium none; achene 2 mm. long, white, smooth, but usually with longitudinal ridges, dull, 6-porose near the base, ovoid, the base triangular.

***Scleria hirtella* Swartz, Prodr. Veg. Ind. Occ. 19. 1788.**

In savannas, wet fields, or bogs, at 1400 meters or less; Alta Verapaz; Petén; Izabal; Jutiapa. Southern United States and Mexico to British Honduras and Panama, southward to Chile and Argentina; West Indies; tropical Africa.

Plants very slender, perennial, with rather stout, aromatic, horizontal rhizomes, the culms erect, 15–60 cm. tall, glabrous or pilose near the apex, acutely trigonous; leaves 4–20 cm. long, 2–5 mm. wide, flat, pubescent, the sheaths hirsute; ligule minute or none; inflorescence interruptedly glomerate-spicate, simple, 4–12 cm. long, with 3–9 sessile, often nutant, remote glomerules; bractlets long-pilose; pistillate scales brown, hirtellous; spikelets 4–5 mm. long; hypogynium none;

achene 1–2 mm. long, obovoid or subglobose, white, smooth and lustrous, not porose at the base or obscurely 9–12-excavate.

***Scleria interrupta*** L. Rich. Act. Soc. Hist. Nat. Paris 1: 113. 1792.

Grassy or rocky hillsides, sometimes in oak forest, 850–1400 meters; Alta Verapaz; Jalapa; Jutiapa. British Honduras; Honduras; Cuba; northern South America.

A slender annual with fibrous roots, the culms 15–50 cm. tall, trigonous, sparsely hirsute; leaves 5–20 cm. long, 1–2 mm. wide, pilose, flat, the sheaths pilose; ligule minute and with a tuft of hairs, or none; inflorescence glomerate-spicate, 5–10 cm. long, with 5–13 glomerules; spikelets 2–4 mm. long, the bractlets linear, hirsute; pistillate scales ovate, purplish, mucronate, ciliate on the keel; hypogynium none; achene rugose-verrucose or tuberculate, 1–1.5 mm. long, mucronate, trigonous, 12-porose at the narrowed base.

***Scleria latifolia*** Swartz, Prodr. Veg. Ind. Occ. 18. 1788.

Dense wet forest or on wet brushy banks, 500–1600 meters; Alta Verapaz; Chiquimula; Santa Rosa. Extending to Panama, and southward to Bolivia and Brazil; West Indies.

Plants perennial, tall and stout, from thick rhizomes; culms triquetrous, sparsely pilose, often 1–1.5 meters tall or even more; leaves 45–60 cm. long, 2–5 cm. wide, abruptly narrowed at the apex, scabrous on the nerves and margins, otherwise glabrous, the sheaths 3-winged; ligule 5–8 mm. long, triangular-ovate, rigid, pilose or glabrous; inflorescence large and usually dense, often 15 cm. long or more, with rigid branches, the peduncles compressed, scabrous; lowest bract foliaceous and 15 cm. long or more, the bractlets setaceous; pistillate scales ovate, mucronate, membranaceous, brown, minutely pubescent; staminate spikelets 3–4 mm. long, lanceolate, short-pedicellate; hypogynium 3-lobate, the lobes deeply and irregularly fimbriate; achene depressed-globose, smooth, 3 mm. long, white or pale purplish.

***Scleria latifolia* var. *arundinacea*** (Kunth) Standl. & Steyerm. Field Mus. Bot. 23: 32. 1944. *S. arundinacea* Kunth, Enum. Pl. 2: 347. 1837. *Pajón blanco*.

Pine forest or in swampy places, sometimes in *Liquidambar* forest, 2000 meters or lower; Alta Verapaz; Izabal; Huehuetenango. British Honduras to Panama, southward to Argentina; Lesser Antilles.

Like the species, but the whole inflorescence dark purple; achenes dark purplish or almost black.

This bears the same relationship to *S. latifolia* that var. *mela-leuca* does to *S. pterota*. There are all sorts of intergrading color

forms between white and almost black achenes, so that *S. arundinacea* perhaps may be regarded as a mere form of *S. latifolia*. Called "navajuela" in Oaxaca.

***Scleria Lindleyana*** Clarke, Kew Bull. Add. Ser. 8: 56. 1908.

Moist places in pine forest, 1000–1500 meters; Chiquimula (south-east of Concepción de las Minas); Jalapa (between Monjas and Jalapa). Honduras; French Guiana and Brazil.

A slender annual with fibrous roots, the culms erect, 10–40 cm. tall, trigonous, glabrous or pilose; leaves flat, 20 cm. long or less, 2–4 mm. wide, pilose, the sheaths pilose; ligule minute, with a tuft of hairs; inflorescence interruptedly spicate, 5–10 cm. long, with 5–8 glomerules; spikelets 2–4 mm. long, the bractlets brown, pilose; scales dark brown, lanceolate or ovate-lanceolate; hypogynium none; achene 1 mm. long, white, smooth and lustrous, globose, mucronate, bearing 4 pores on each side of the trigonous base.

The species has not been recorded previously from North America.

***Scleria lithosperma*** (L.) Swartz, Prodr. Veg. Ind. Occ. 18. 1788.

*Scirpus lithospermus* L. Sp. Pl. 51. 1753.

Savannas, open rocky banks, or wet pine forest, ascending from sea level to 1450 meters; Petén; Izabal. Florida to Mexico, British Honduras, and Panama, southward to Bolivia; Pacific islands and tropical Asia.

Plants perennial, from rather short, nodose rhizomes, erect, the culms very slender, triquetrous, glabrous, 30–60 cm. tall; leaves several, 10–20 cm. long, involute, 1–3 mm. wide, glabrous but scabrous on the margins and keel; sheaths pilose or almost glabrous, purplish; ligule short, triangular, pilose; inflorescence axillary and terminal, simple or branched, of 1–4 distant interrupted spikes, few-flowered; spikelets 3–4 mm. long; bracts filiform, glabrous, the bractlets dark brown, glabrous; scales dark brown, ovate-lanceolate; hypogynium none; achene 2–2.5 mm. long, white, smooth and lustrous, oblong or ovoid-ellipsoid, umbonate, the base narrowed, not porose.

***Scleria macrophylla*** Presl, Rel. Haenk. 1: 200. 1838. *S. paludosa* Poepp. & Kunth, in Kunth, Enum. Pl. 2: 344. 1837. *S. macrocarpa* Salzm. ex Schlecht. Bot. Zeit. 3: 492. 1845, as synonym.

Swampy thickets, sometimes in *Manicaria* swamps, at or little above sea level; Izabal. Southern Mexico and British Honduras to Panama, southward to Brazil and Bolivia.

Plants erect, perennial from stout rhizomes, coarse and stout, the culms 1–2 meters tall, sharply triquetrous, smooth, or rough on the angles; leaves 5–7-nerved, 20–40 cm. long, stiff, attenuate-acuminate, 1–4.5 cm. wide, smooth or somewhat roughened on the nerves and margins, the sheaths 3-winged; ligule short, ovate,



obtuse, rigid; inflorescence paniculate, often much elongate, with erect branches, the spikelets densely clustered; bracts foliaceous, the bractlets setaceous, pubescent; staminate spikelets 4 mm. long, ovoid or oblong-ovoid; staminate scales lanceolate, acuminate, minutely pubescent; pistillate scales ovate-orbicular, ciliate and minutely pubescent; hypogynium large, undulately 3-lobate, the margin ciliate; achene globose-ellipsoid, white or brownish white, smooth and lustrous, 3.5–6 mm. long, umbonate.

Called "cortadera" in Oaxaca.

***Scleria microcarpa* Nees, Linnaea 9: 302. 1834.**

In swamps or marshes, at 1400 meters or less; Alta Verapaz; Izabal; Suchitepéquez. Tabasco to British Honduras and Panama, southward to Paraguay; Cuba.

Plants erect, perennial from rather stout, horizontal rhizomes, the culms acutely trigonous, usually about a meter tall, glabrous; leaves 20–40 cm. long, 7–11 mm. wide, glabrous or somewhat scabrous on the margins, the sheaths 3-winged, glabrous or nearly so; ligule 1 cm. long or less, lanceolate, rigid, glabrous; inflorescence paniculate, the panicles axillary and terminal, erect, very narrow, loosely flowered, the lowest bract leaflike, the bractlets linear-subulate, minute; staminate spikelets oblong-ovoid, the glumes ovate, obtuse, stramineous; pistillate scales ovate-orbicular, stramineous; margins of the hypogynium ciliate; achene 1–2 mm. long, ellipsoid-ovoid, white, smooth and lustrous, umbonate.

***Scleria micrococca* (Liebm.) Steud. Syn. Pl. Cyp. 179. 1855.**  
*Hypoporum micrococcum* Liebm. Vidensk. Selsk. Skr. V. 2: 256. 1850.  
*Scleria areolata* Lundell, Amer. Midl. Nat. 29: 471. 1943.

Known in Guatemala only from the department of Quiché, the exact locality unknown (*Aguilar 1419*). British Honduras (Monkey River, *Gentle 4047*, type of *S. areolata*); Mexico; Costa Rica; Nicaragua; Panama; Cuba; northern South America to Amazonian Brazil.

Plants annual with fibrous roots; culms erect, slender, 10–50 cm. tall, trigonous, glabrous or pubescent; leaves 3–27 cm. long, 1–2.5 mm. wide, glabrous or pubescent, about equaling or longer than the culm, somewhat involute in drying; ligule minute, pubescent; inflorescence 5–15 cm. long, virgately or paniculately branched, glomerules interrupted; rachis pilose to glabrate; bracts mostly setaceous or lower bract foliaceous, bractlets dark brown; spikelets 3 mm. long, the scales dark brown, acuminate, the staminate lanceolate, the pistillate ovate-lanceolate; hypogynium none; achene 1 mm. long, white, inconspicuously reticulate or verrucose, subglobose, apiculate, attenuate, bearing 4–5 pores on each side of the trigonous base.

Dr. Core has studied the type collection of *S. areolata* and considers it to be conspecific with *S. micrococca*. Our examination of this collection has confirmed his study.

*Scleria mitis* Berg. Vet. Akad. Handl. Stockh. 26: 145. *pl.* 5. 1765.

Wet thickets or in *Manicaria* swamps, at or near sea level; Izabal. British Honduras to Panama, Bolivia, and Paraguay; West Indies.

A rather stout perennial from thick woody rhizomes, the culms usually in clumps, commonly 1–2 meters tall, triquetrous, smooth or slightly roughened on the angles; leaves 60 cm. long or less, 1–2.5 cm. wide, flat, rigid, glabrous but scabrous on the nerves and margins, the sheaths 3-winged; ligule 3 mm. long or less, narrow, glabrous; panicles about 30 cm. long, narrow, loosely many-flowered, the branches erect; lowest bract leaflike, the very short bractlets setaceous; spikelets small, ovoid, the pistillate scales ovate-orbicular, abruptly acuminate; hypogynium truncate, densely ciliate with brown or red-brown hairs; achene ellipsoid, 2–3 mm. long, smooth, white or sometimes discolored, tipped by the small conic black style base.

*Scleria oligantha* Michx. Fl. Bor. Amer. 2: 167. 1803.

Shaded slopes, sometimes in pine forest, 1200–1800 meters; Alta Verapaz; Zacapa; Jalapa. Eastern and central United States and Mexico; Honduras.

Plants perennial from an elongate rhizome, the slender culms erect, 30–60 cm. tall, acutely trigonous, glabrous or nearly so; leaves 12–25 cm. long, 2–6 mm. wide, scabrous on the nerves and margins, somewhat revolute when dry, the sheaths narrowly winged, pubescent or glabrous, the lower ones purplish; ligule short, ovate, pubescent, scarious-margined; inflorescence of 2–5 dense clusters of spikelets, terminal and axillary, the lateral clusters on long filiform peduncles; bracts leaflike, 5 cm. long, ciliate, the bractlets ciliate, pubescent dorsally, linear-lanceolate; scales lance-ovate, purplish, mucronate; hypogynium a narrow, obtusely triangular border supporting 8–9 small tubercles; achene 3–4 mm. long, ovoid, white and lustrous.

*Scleria pterota* Presl, Isis 21: 268. 1826. *S. pratensis* Lindl. ex Nees, Nov. Acta Acad. Leop. Carol. 19, Suppl. 1: 121. 1843. Figure 33.

Moist forest or thickets, often in ditches, chiefly at 500 meters or less, but sometimes ascending to about 1300 meters; Alta Verapaz; Santa Rosa; Escuintla; Suchitepéquez; Retalhuleu; San Marcos. Southern Mexico and British Honduras to Panama, southward to Argentina; West Indies.

Plants perennial from a thick nodose elongate rhizome, erect, the culms rather slender, mostly 35–60 cm. high but often taller, frequently clustered, sharply triquetrous, glabrous, slightly roughened on the angles; leaves 15–40 cm. long, 5–15 mm. wide, glabrous, scabrous on the margins, flat, the sheaths narrowly 3-winged; ligule ovate-triangular, 4–10 mm. long, pilose, with cartilaginous margin; inflorescence green or yellowish brown, with 3–4 axillary and terminal panicles,



FIG. 33. *Scleria pterota*. a, Habit of upper portion of flowering plant ( $\times \frac{1}{2}$ ). b, Habit of lower portion of plant ( $\times \frac{3}{4}$ ). c, Portion of fruiting branch ( $\times 8$ ).



the rachises minutely pubescent or almost glabrous, the panicles 5–15 cm. high; lowest bract leaflike, equaling the culm, the bractlets filiform; spikelets greenish brown or tinged with purple, the staminate scales lanceolate, acuminate; pistillate scales ovate-orbicular, abruptly acuminate; hypogynium depressed, 3-lobate, the lobes broad, rounded, ciliate or glabrous; achene 1.5–2.5 mm. long, depressed-globose or sometimes pointed, smooth, white or yellowish brown, umbonate at the apex.

***Scleria pterota* var. *melaleuca*** (Reichb.) Uttien, Fl. Surinam 40. 1934. *S. pterota* var. *melaleuca* (Reichb.) Standl. Field Mus. Bot. 18: 106. 1937. *S. melaleuca* Reichb. ex Schlecht. & Cham. Linnaea 6: 29. 1831.

Wet or moist, mixed or pine forest or in thickets or in moist or wet ground generally, chiefly at or near sea level, but ascending to about 900 meters; Petén; Alta Verapaz; Izabal; Zacapa; Jutiapa; Escuintla; Retalhuleu. Southern Mexico and British Honduras to Panama, southward to Bolivia and Brazil; West Indies.

Like the species, but the whole inflorescence often dark purple; achene purplish to almost black.

Called “navajuela” in Honduras and “cortadera” or “zacate cortador” in Oaxaca. *Scleria pterota* and its variety are the commonest representatives of the genus throughout Central America.

***Scleria reticularis*** Michx. Fl. Bor. Amer. 2: 167. 1803.

Wet meadows or rocky forest of the Oriente, often in pine-oak forest, 800–1800 meters; Chiquimula (Montaña Castilla, southeast of Quezaltepeque); Jalapa (east of Jalapa); Jutiapa (between Agua Blanca and Amatillo). Eastern and central United States; Mexico; Honduras.

Plants perennial from a short rhizome, erect, the culms very slender, triangular, glabrous, 20–50 cm. tall, somewhat scabrous below on the angles; leaves few, 10–20 cm. long, 1–3 mm. wide, flat, scarcely equaling the culms, the sheaths narrowly 3-winged, glabrous or nearly so; panicles terminal and axillary, small, the lateral ones sessile or on short erect peduncles, few-flowered; bracts leaflike, the bractlets linear-setaceous, glabrous; staminate spikelets lanceolate, stramineous; pistillate scales ovate-lanceolate, acuminate, stramineous; hypogynium 3-lobate, the lobes lanceolate, obtuse, appressed to the base of the achene; achene 1–2 mm. long, globose, conspicuously reticulate, dull white, mucronulate.

The species has not been reported previously from Central America.

***Scleria secans*** (L.) Urban, Symb. Antill. 2: 169. 1900. *Schoenus secans* L. Syst. ed. 2. 865. 1759. *Scleria reflexa* HBK. Nov. Gen. & Sp. 1: 232. 1816. *Navajuela*; *Sec* (Quecchí).

Moist or wet thickets, at sea level or ascending to about 500 meters; Petén; Alta Verapaz; Izabal; Suchitepéquez; Huehuetenango. Southern Mexico and British Honduras to Panama and Paraguay; West Indies.

A perennial with rhizomes, the culms suberect and about a meter high or often as much as 5 meters long or more and scandent over shrubs and small trees, acutely triquetrous, with very rough angles; leaves numerous, long and narrow, 2-5 mm. wide, very scabrous on the margins and costa, sometimes also pubescent, the sheaths retrorsely scabrous, pubescent toward the apex; ligule usually conspicuously scarious-appendaged, rounded-ovate, dark brown, glabrous, the margin lacerate; inflorescences terminal and axillary in the upper leaves, the peduncles pilose on the angles, the bracts foliaceous, the bractlets setaceous, pilose, the spikelets reflexed; pistillate scales ovate, acute, glabrous, dark purple or blackish; hypogynium flat, suborbicular, almost entire, the margin reflexed and undulate; achene 2-4 mm. long, globose-ovoid, white, smooth, lustrous, minutely white-pubescent.

The plant is a great pest where it grows abundantly, for the sharp-edged leaves cut the hands and arms painfully, and the tough stems form dense tangles.

**Scleria setacea** Poir. in Lam. Encycl. 7: 4. 1806. *S. hemitaphra* Steud. Syn. Pl. Cyp. 169. 1855.

In savannas or pine forest, at 1350 meters or less; Izabal; Chiquimula; Santa Rosa. Eastern and central United States to Mexico, British Honduras, Honduras and Panama, southward to Bolivia and Brazil; West Indies.

Plants annual and with fibrous roots or perennial and with a very short rhizome, the very slender culms trigonous, glabrous, tufted, 15-60 cm. tall, weak and sometimes spreading; leaves flat, 1-4 mm. wide, glabrous or sparsely hirsute, sometimes scabrous on the margins and nerves, the sheaths glabrous or nearly so, sometimes narrowly winged; ligule short, rounded and obtuse, pilose; panicles terminal and axillary, the lateral ones on long, filiform, often recurved or drooping peduncles, loosely flowered; spikelets 2-4 mm. long, the bracts glabrous, linear-lanceolate, the bractlets linear-lanceolate or setaceous, glabrous; pistillate scales ovate-lanceolate, acuminate, stramineous or tinged with purple; hypogynium deeply 3-lobate, the lobes ovate-lanceolate, subacute, appressed; achene 2 mm. long, globose-ellipsoid, more or less reticulate, the transverse ridges pilose, dirty white, umbonate.

Called "navajuela" in El Salvador.

**Scleria setuloso-ciliata** Boeckl. Flora 65: 30. 1882.

Wet soil, especially along streams, at 1500 meters or less; Alta Verapaz; Chiquimula; Suchitepéquez; Sololá. Veracruz; Honduras; Panama; Cuba; Brazil.

Plants perennial, the rhizome short or none, the culms about a meter tall, stout, erect, triquetrous, retrorsely scabrous on the angles; leaves 15–30 cm. long, 1–2 cm. wide, scabrous on the margins and nerves, the sheaths winged; ligule short and rounded, with membranaceous margin; panicles terminal and in the upper leaf axils, 5–10 cm. long, the bracts leaflike, the bractlets linear, scabrous-ciliate, elongate; pistillate spikelets stramineous; hypogynium 3-lobate, the lobes appressed, rounded, with crenulate margins, white; achene 3–4 mm. long, ovoid, white, smooth and lustrous, mucronate.

**Scleria verticillata** Muhl. ex Willd. Sp. Pl. 4: 317. 1805.

Moist or dry slopes, usually in pine forest, in the Oriente at 1000–1500 meters; Zacapa; Chiquimula. Eastern United States and Mexico; El Salvador; Honduras; West Indies; Venezuela, Surinam, and Brazil.

Plants very slender, annual, with capillary roots, sometimes fragrant in drying, the culms triquetrous, 10–50 cm. tall, glabrous or sometimes minutely pubescent; leaves 5–30 cm. long, 1–2 mm. wide, linear or filiform, glabrous, the sheaths usually pilose; inflorescence interruptedly glomerate-spicate, simple, of 2–8 erect glomerules; spikelets 2–3 mm. long, castaneous, few-flowered, the bracts glabrous, 6–7 mm. long, often caudate, the bractlets glabrous; scales oblong-lanceolate, reddish-brown, glabrous, carinate; hypogynium none; achene 1 mm. long, reticulate or verrucose, trigonous-globose, white, fragile, mucronate, about 5-porose just above the narrowed trigonous base.

The species has not been recorded previously from Central America.

### UNCINIA Persoon

*Reference:* Mackenzie, N. Amer. Fl. 18: 6–8. 1931.

Perennials, the rootstocks short or emitting long slender stolons; culms erect; leaves linear, flat or convolute; flowers unisexual, monoecious, in solitary, androgynous, dense or lax, bracteate or ebracteate spikes, the apical staminate portion short; glumes in few to several ranks; perianth none; stamens commonly 3; pistillate flowers each borne in the axis of a glume and surrounded by a perigynium, this closed except for a minute orifice; perigynia obscurely trigonous, truncate at the orifice; achenes triangular; style slender, usually thickened at the base, included, geniculate with the achene; stigmas 3, exserted; rachilla at the side of the achene conspicuous, exserted, setiform, uncinatate at the apex.

About 30 species, all except the following confined to Australasia and the mountains of South America. One species, *U. tenuis* Poepp., extends from South America into the mountains of Costa Rica.

**Uncinia hamata** (Swartz) Urban, Symb. Antill. 2: 169. 1900. *Carex hamata* Swartz, Prodr. Veg. Ind. Occ. 18. 1788. *Uncinia jamaicensis* Pers. Syn. Pl. 2: 534. 1807. *U. hamata* var. *mexicana* Kuekenh. Pflanzenreich IV. 20: 54. 1909. *Sintule*; *Pajón*. Figure 34.





FIG. 34. *Uncinia hamata*. a, Perigynium ( $\times 8$ ). b, Achene ( $\times 8$ ). c, Habit ( $\times \frac{1}{2}$ ).

Wet or moist, mixed forest, often in *Cupressus* forest or even in pine forest, 900–3000 meters, chiefly at middle or rather high elevations; Alta Verapaz; Zacapa (Sierra de las Minas); Jalapa; Sacatepéquez; Suchitepéquez; Chimaltenango; Quezaltenango; San Marcos. Southern Mexico to Panama, southward to Argentina; Greater Antilles.

Plants densely caespitose, not stoloniferous, the slender culms 25–60 cm. tall, obtusely trigonous; leaves 6–15 to each culm, the blades 10–40 cm. long, 2–12 mm. wide, rough on the upper surface; spike solitary, ebracteate, linear-cylindric, 6–18 cm. long, 2.5–3.5 mm. wide; pistillate glumes green, obovate-orbicular to oblong-obovate, 4–6 mm. long, obtuse or acutish, closely appressed; perigynia oblanceolate, 4.5–6 mm. long, many-nerved, hispidulous above, the margins ciliate, not beaked; rachilla exserted for 3–6 mm., strongly uncinatate at the apex.

The plant seems to be less plentiful in Guatemala than in the mountains of Costa Rica. It is a great pest, wherever found, because the hooked bristles cling tenaciously to clothing and penetrate the skin readily.

### PALMAE. Palm Family

*Reference:* B. E. Dahlgren, Index of American palms, Field Mus. Bot. 14. 1936.

Large or small plants, solitary or gregarious, shrublike or treelike, hermaphrodite, monoecious or dioecious, usually polycarpic but sometimes monocarpic, the caudex thick or slender, cylindric, emitting at the base simple or branched, epigeal or hypogean roots, simple or very rarely branched, rarely scandent, usually annulate, unarmed or armed with spines; leaves terminal, or remote along the upper part of the caudex, large for the size of the plant, palmately or pinnately cleft, rarely bipinnate, or often simple, the segments distinct or confluent; petiole usually more or less produced into the blade, dilated at the base into a short or elongate, open or closed sheath, the sheath fibrous on the margins or throughout; inflorescence (spadix) long-pedunculate and inserted among the leaves or short-pedunculate and inserted below them, simple or branched, the rachis short or elongate, the branches paniculately or flabellately arranged; spadix bearing various spathes, these numerous, tubular, and sheathing the peduncle, or more often 2–4, the lower ones then incompletely vaginate, the upper one usually much larger, coriaceous or ligneous, enclosing the immature spadix, finally splitting ventrally; flowers articulate or continuous with the spadix, sometimes immersed in pits formed of connate bracts, solitary or ternate with the central one pistillate, small or rarely large, regular and perfect, or unisexual; perianth double, each series trimerous, in the pistillate flower usually accrescent after anthesis; sepals 3, distinct or connate, open or imbricate in bud, in the pistillate flower usually broad and imbricate; petals 3, distinct or connate, in the staminate flower valvate or rarely imbricate, in the pistillate flower convolute-imbricate, rarely valvate at the apex or throughout; stamens usually 6, biseriate opposite the sepals and petals, rarely more numerous, inserted in the base of the corolla, usually included; staminodia of the pistillate flower none or scale-like or subulate or connate to form an annulus or cupule, the filaments free or connate, subulate or filiform, rarely complanate; anthers linear,

oblong, or sagittate, basifixed or dorsifixed, 2-celled, erect or versatile; ovary free, in the staminate flower rudimentary or none, 1-celled at the base or perfectly or imperfectly 2-3-celled, rarely 4-7-celled, entire, trilobate, or of 3 distinct carpels; style none or short, rarely elongate, the stigmas 3, short, erect or recurved, subulate or rarely elongate; ovules solitary and erect or sometimes subhorizontal or pendulous; fruit more or less subtended by the persistent perianth, dry or drupaceous, with one or rarely more numerous cells, the exocarp smooth, warty, prickly or scaly, the mesocarp usually fibrous, the endocarp membranaceous, crustaceous, ligneous, or stone-like; seed free or adherent to the endocarp, the hilum basal or lateral, the raphe short or elongate, with numerous simple, branched, or reticulate branches; endosperm corneous or cartilaginous, usually oily, solid or hollow, uniform or ruminate.

The palms constitute a large, almost exclusively tropical, and in many respects important group of plants, of distinctive aspect, and seldom confused with any other groups except perhaps Cycadaceae and Cyclanthaceae. More than any other single group of plants they give to the regions in which they grow a peculiar tropical appearance. There are, of course, many tropical regions in which no palms occur, particularly those of high elevation, although in Guatemala palms do grow in the higher mountains where there is abundant moisture and not too great cold, some of the Chamaedoreas ascending to about 2700 meters or perhaps even slightly higher. Some of the palms, notably the coconut and date, are of great economic importance in various parts of the earth, but in Guatemala, as in Central America generally, they are relatively little used by man. Some do have edible fruits and oil-bearing seeds. Others supply edible inflorescences or "cabbages," and in the lowlands the larger leaves are important thatch material. The so-called palm wine consists of the fermented sap of certain large palms. Leaves of many Guatemalan palms are used for making hats, mats, and a wide variety of other small articles. However, if all Guatemalan palms were destroyed over night, the life of the people would be little affected, because for most of these purposes other plants could be substituted.

One of the local industries that consumes a great quantity of palm leaves is the manufacture of *syacales* (known in Quechí as *mooch*), sheets made by basting together pinnae of the larger leaves, for use by travelers as a protection against rain. In Alta Verapaz these are said to be made from the leaves of a palm called "bojmal" or "pamac," whose identity is uncertain, but it is certain that the leaves of various genera of palms are used for the purpose. Rabinal is celebrated for the *petate chiapaneco* (mats) woven there from palm leaves and noted for their thickness, durability, and color designs.

Taxonomically many of the Central American palms are still imperfectly understood, although about some of the smaller genera



there probably is little more to be learned, so far as species representation is concerned. The paucity of information regarding some palms is caused by the great size of the plants, which makes it impossible to prepare ordinary herbarium specimens, such as have been found quite satisfactory in study of most groups of plants. Only in the smaller palms, such as *Chamaedorea* and *Reinhardtia* do herbarium specimens give an adequate idea of the appearance of the living plant. On this account the Guatemalan palms have been less collected than most other families. While it is likely that all or most of the genera of the region are represented in the following lists, it is almost certain that other species await collection and study, especially in the large genus *Chamaedorea*. The palms of Guatemala have suffered also from the fact that for some inexplicable reason they have been studied almost wholly in Alta Verapaz. While that department probably does possess more species of palms than any other, palm plants are found throughout the country at low and middle elevations, and in some places are much more conspicuous than in Alta Verapaz.

Study of Central American palms has been vastly facilitated in recent years by the numerous generic monographs published by Burret and the *Index of American Palms* by Dahlgren.

Besides the palms formally listed and described here, a good many exotic ones are in cultivation in Guatemalan gardens. Since no special attention has been given them by recent collectors, and since cultivated palms often are difficult of determination, only a few of them can be listed here.

The following key has been furnished by Dr. H. E. Moore. The nomenclature used in the present treatment is in accordance with Dr. Moore's latest studies of the various groups concerned. He has revised the manuscript and revised the treatment of *Chamaedorea*, and is currently monographing it.

Leaves palmate or costapalmate.

Perianth in one cycle, forming a 6-dentate cup; carpel 1. . . . . *Thrinax*

Perianth in two cycles; carpels 3 or, in *Schippia*, 1.

Carpels 1 or 3, the styles free and recurved; spathes inflated and sheathing only the peduncle, the primary branches of the spadix with deciduous bracts.

Flowers with a pediceliform base; carpel 1. . . . . *Schippia*

Flowers without a pediceliform base; carpels 3. . . . . *Cryosophila*

Carpels 3 and connate by the styles or united; spathes tubular or expanded in a blade, sheathing all the primary branches of the spadix.

Carpels united, forming a depressed-globose fruit with basal stigmatic scar; flowers solitary; petiole unarmed. . . . . *Sabal*

Carpels free, connate by the styles, forming a globose or laterally compressed fruit, stigmatic remains apical or subapical in fruit.

Spathes tubular below, expanded in a blade above, equaling the primary branches of the inflorescence; fruit pseudostipitate with abortive carpels at the apex; perianth glumaceous. . . . . *Washingtonia*

Spathes tubular, sheathing bases of primary branches only, never equaling the branches; fruit sessile with abortive carpels basal; perianth not glumaceous.

Ovary glabrous; integument not intruded into the endosperm below the raphe of the seed; stems cespitose. . . . . *Paurotis*

Ovary pubescent at the very base and young fruit prominently tomentose; integument intruded into the endosperm below the raphe of the seed; stems solitary or more rarely cespitose.

Flowers in groups of 3 at least at the base of the branchlets; mature fruit ellipsoid to subglobose, 20 mm. long or more with blunt subapical scar. . . . . *Erythea*

Flowers solitary; fruit ellipsoid, 18 mm. long or less, with apiculate stigmatic scar. . . . . *Brahea*

Leaves pinnate or bipinnate.

Leaves bipinnate, the pinnules shaped like a fishtail. . . . . *Caryota*

Leaves once pinnate.

Lower pinnae slender, stiff, and spinelike, the leaves induplicate in bud.

*Phoenix*

Lower pinnae not spinelike, the leaves reduplicate in bud.

Endocarp without pores, the abortive carpels not fused with the fruit.

Spathes 3 or more.

Dioecious palms; staminate flowers with valvate or united petals.

*Chamaedorea*

Monoecious palms; flowers borne in groups of 3 or in lines of several along the branchlets, the pistillate lowermost.

Pistillate flowers with imbricate petals; slender palms with 5-10 flowers in lines. . . . . *Synechanthus*

Pistillate flowers with valvate petals; thickish palms with flowers in groups of 3 at least near the base of the branchlets. . . . *Opsiandra*

Spathes 1-2.

Leaf sheaths forming a conspicuous crownshaft, the spadices infrafoliar.

Petals of pistillate flowers imbricate; fruit with lateral or subapical stigmatic scar. . . . . *Euterpe*

Petals of pistillate flowers valvate; fruit with basal stigmatic scar.

*Roystonea*

Leaf sheaths not forming a conspicuous crownshaft, the spadices arising among the leaves but sometimes persisting below them.

Fruit tuberculate with corky points and ridges; pistillate flowers larger than staminate and with valvate petals. . . . . *Manicaria*

Fruit not tuberculate; pistillate flowers smaller than staminate and with imbricate petals.

Flowers not immersed in the branches of the spadix; perianth not glumaceous; stamens 8-40. . . . . *Reinhardtia*

Flowers immersed in the branches or axis of the spadix; perianth glumaceous; stamens 6.

Anthers with parallel locules united to the connective.

*Calyptrogyne*

Anthers with locules separated, divergent, reflexed or pendulous.

Staminodial tube urceolate with 6 lanceolate radiating lobes; ovary with a terminal style.....*Asterogyne*

Staminodial tube cylindric and truncate, entire or more or less toothed or lacinate at the apex; ovary with elongate lateral or basal style.....*Geonoma*

Endocarp with 3 distinct pores, the abortive carpels fused with the fertile.

Unarmed palms.

Fruit very large, to 25 cm. long or more.....*Cocos*

Fruit less than 15 cm. long.

Petals of staminate flowers rounded and fleshy, linear-subulate or narrow; stamens 6; locules of the anthers not twisted...*Scheelea*

Petals of staminate flowers flat; stamens 12-24; locules of the anthers separate and divergent, irregularly twisted, inrolled or sinuous.

*Orbignya*

Armed palms.

Perianth of pistillate flowers divided nearly to the base; staminate flowers immersed in the rachilla.....*Acrocomia*

Perianth of pistillate flowers united, cupuliform, tubular or urceolate.

Staminate flowers immersed in the axis and densely congested at the upper part of the axis.....*Astrocaryum*

Staminate flowers not immersed in the axis, mostly scattered among the pistillate.

Terminal pinnae modified into straight or recurved hooks; stems vinelike, not self-supporting.....*Desmoncus*

Pinnae never developed into hooks, the rachis covered with segments to the apex; stems erect.....*Bactris*

## ACROCOMIA Martius

*Reference:* L. H. Bailey, *Acrocomia*—preliminary paper, *Gentes Herb.* 4: 420-476. f. 254-298. 1941.

Tall palms, armed with spines, the trunks solitary, annulate, densely armed with long, straight spines; leaves large, terminal, pinnatisect, the segments linear-lanceolate, obliquely acuminate, the margins naked, recurved at the base, the costa, petiole, and rachis armed with long spines, the sheath short, open; spadices pedunculate, spiny, the branches thick, the pistillate portion flexuous, with remote flowers, the staminate portion elongate, cylindraceous; spathes 2, the lower open at the apex, the upper ligneous, fusiform, spiny; bracts of the staminate flower confluent, those of the pistillate flower membranaceous; staminate flowers numerous, immersed in the branches, the pistillate few, large, sessile at the bases of the branches; staminate sepals minute, scarious, ovate-oblong, obtuse, only slightly imbricate; corolla subcylindric, carnose at the base, obtusely trigonous, the segments oblong, valvate; stamens 6, the filaments filiform, adnate to the bases of the corolla segments, the anthers exerted, linear-oblong, dorsifixed, versatile; pistillate flowers much larger than the staminate, ovoid, the perianth little accrescent in fruit, the sepals minute, imbricate, the petals longer, coriaceous, free or connate at the base,



convolute-imbricate; ovary ovoid, 3-celled, the stigmas 3, sessile, subulate-lanceolate, revolute, the ovule horizontal; fruit globose or oblong, glabrous or setulose, 1-seeded, the stigmas terminal, the pericarp mucilaginous, fibrous within, the endocarp thick, 3-pored at the middle; seed globose or trilobate, affixed to the side of the cell, the testa reticulate by the branches of the raphe, the endosperm hard, simple, the embryo opposite one of the pores.

Twenty-five species are recognized by Bailey, ranging from Mexico into South America. Two others have been described from southern Central America.

Lower surface of the leaves loosely pubescent.....*A. mexicana*  
 Lower surface of the leaves almost glabrous, except for a few appressed hairs.  
*A. belizensis*

***Acrocomia belizensis*** L. H. Bailey, Gentes Herb. 4: 445. f. 273, 274. 1941. *Suba*.

Occurring at or little above sea level, sometimes growing with pines, British Honduras; type from pine ridge, Duck Run, El Cayo District, *H. H. Bartlett 11561*.

According to Bailey, differing from *A. mexicana* in having more slender parts, the spines much smaller, the pinnae much smaller and not gray or pubescent beneath but only with a few, very small, appressed hairs, the petiole and rachis bearing many very small prickles with hairs on the surface, the spadix very slender at anthesis, the main axis and rachillas smooth and glossy at maturity, the fruit smaller, lustrous, only slightly depressed; pinnae very numerous, the rachis long and slender, shallowly sulcate but not flattened, mostly less than 1 cm. broad but sometimes 2 cm., gray and dull; costa and nerves of the pinnae prominent, glabrous except for a few points and appressed hairs beneath; main spines of the leaf rachis 9 cm. long or shorter; base of the petiole 3 cm. broad or less, enclosed in a clothlike hairy sheath 5 cm. broad or more; main spathe to 20 cm. broad, thick and heavy, densely invested with fibrous wool and covered with many flat, very sharp, black spines 2-6 cm. long; axis of the spadix glabrous, unarmed, lustrous; flowers small; fruit about 3 cm. in diameter, slightly flattened at each end, somewhat lustrous but the surface rough.

It is unknown whether all the *Acrocomias* of British Honduras are referable to *A. belizensis*, or whether some are *A. mexicana*. Further study will be necessary to decide whether two species of the genus are represented in Guatemala and British Honduras, since the coyol is widely distributed, and it is difficult to suggest a line at which two geographic species might be separated.

***Acrocomia mexicana*** Karwinsky ex Mart. Hist. Nat. Palm. 3: 285. pl. 138. 1845. *Coyol*; *Tuc* (Maya); *Map* (Quecchí); *Cocoyol*; *Supa* (Petén). Figure 35.

Widely distributed, mostly at 1000 meters or lower, often abundant in rather open, lowland forest, or on dry open hillsides, often abundant on plains, and left when land is cleared; Petén; Alta Verapaz; Baja Verapaz; El Progreso; Zacapa; Chiquimula; Jutiapa; Santa Rosa; Escuintla; Suchitepéquez; Sololá; Retalhuleu; Quezaltenango; San Marcos; Huehuetenango; Quiché. Southern Mexico; probably extending into Honduras and El Salvador.

A large palm, the trunk often 10 meters high, thick and massive, cylindric, usually abundantly armed with long sharp dark spines; leaves 4 meters long or shorter, often drooping, the dead leaves covering the upper part of the trunk; pinnae close together but unequally spaced; petiole and rachis hairy and more or less setose, armed with flat, brownish black, lustrous spines 11 cm. long or less; pinnae at the middle of the leaf 1 meter long or more and about 3 cm. wide, the nerves thinly hairy beneath, the rachis spiny throughout; main spathe 70–80 cm. long, narrow-pointed at the apex, densely and softly brown-tomentose and often bearing slender spines 1 cm. long; spadix about equaling the spathe, the branches glabrous or glabrate, the peduncle hairy, setose, and spiny, the branches or rachillae about 25 cm. long; staminate flowers 8 mm. long at anthesis, the calyx one-fourth or one-fifth as long as the deeply obtuse-lobate corolla; anthers exerted; pistillate flowers few on each rachilla, about 1 cm. long in anthesis, the styles somewhat exerted; corolla tightly involute, curved-striate; fruit depressed-globose, about 3.5 cm. high and 4 cm. broad, brownish and somewhat mottled, glabrous, the appressed calyx about 1.7 cm. broad.

This is perhaps the most common native palm of Guatemala, as it and its congeners are found through much of Central America. It is widely distributed in Guatemala and often conspicuous on the landscape, although there are, of course, large areas from which it is absent. Frequently it is planted in regions where it is not native, for ornament or perhaps sometimes for its fruit. The tree is known everywhere by the name "coyol," a word of Nahuatl origin, which appears in such place names as Coyoles, El Coyolar, Río Coyolapán, and Río Coyolate. The fruiting panicles are very large, heavy, and pendent, producing large numbers of the small fruits, of characteristic appearance. These are boiled with sugar and eaten. The amount of flesh is scant, and the fruits are a very poor food, but great quantities of them thus prepared are offered for sale in most of the markets and must find ready customers. The kernels of the seeds, too, are sometimes eaten, at least by children. Boys at Huehuetenango cracked them by placing the nut between cobblestones, then throwing rocks at it. They said they didn't crack the nuts with a stone held in the hand because they were too hard to be broken that way. The hard part of the nut is used for making finger rings, rosary beads, and other articles. The fresh inflorescences often are used as decorations, and bring a good price for this purpose in regions where the

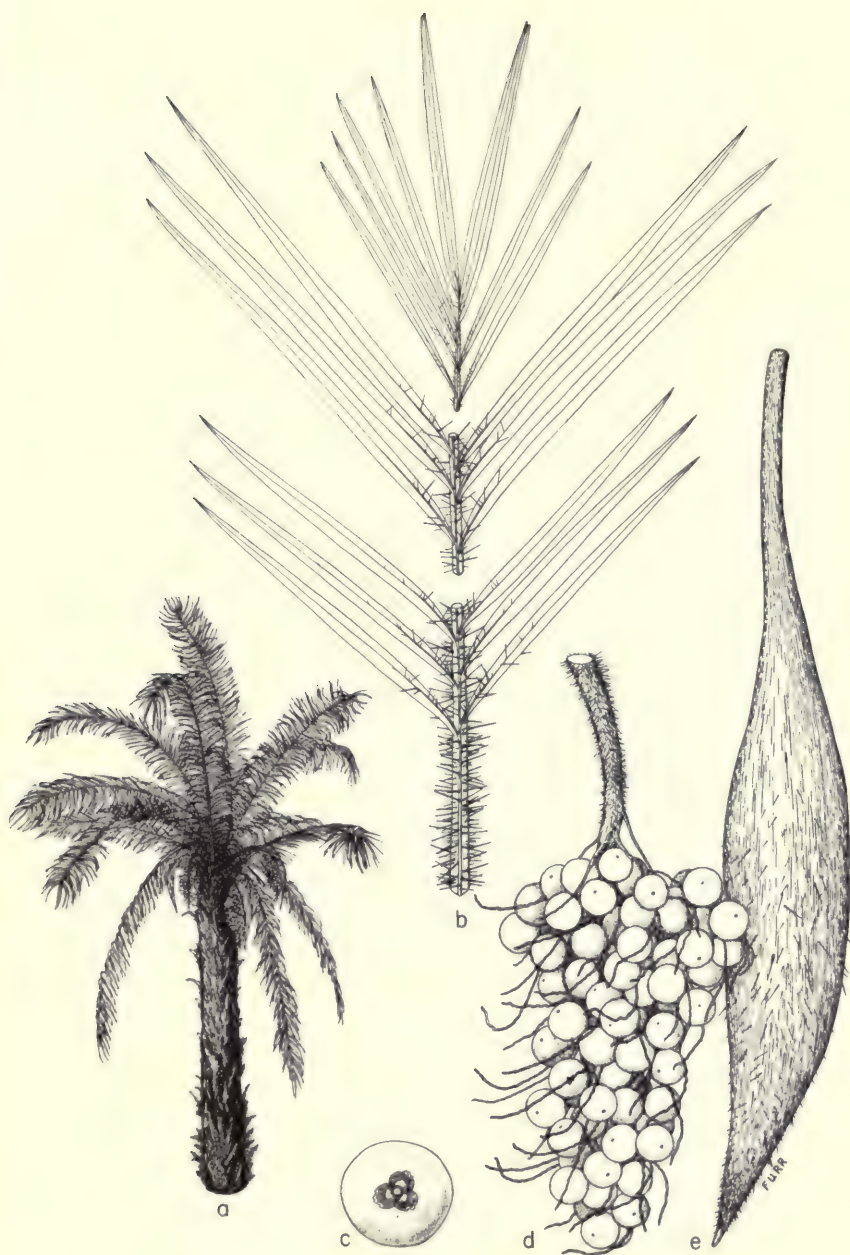


FIG. 35. *Acrocomia mexicana*. *a*, Habit. *b*, Portions of leaf ( $\times \frac{1}{8}$ ). *c* Fruit, from below ( $\times \frac{1}{4}$ ). *d*, Fruiting cluster ( $\times \frac{1}{8}$ ). *e*, Spathe ( $\times \frac{1}{8}$ ).



palm is not native. The fruits are much eaten by cattle and other stock. In cavities in felled trunks there collects a quantity of sap which is drunk when beginning to ferment, or later, when it sometimes is intoxicating. It is a favorite beverage among the *vaqueros* of the Pacific coast. This *vino de palma* is well known in most parts of Central America where *Acrocomias* are native.

### ASTEROGYNE Wendland

*Reference:* M. Burret, Bot. Jahrb. 63: 140. 1930.

Small unarmed plants, the caudex slender, densely annulate; leaves simple, oblong, bifid, usually entire, the segments acuminate, plicate-nerved; spadix long-pedunculate, once-branched, the branches subfasciculate, strict, rigid, stout; spathes 2-4, subpersistent; bracts small, continuous with the orifice of the pit of the rachis, the bractlets scale-like; flowers small, glumaceous, unisexual, sunken in spirally arranged pits in the rachis, in groups of 3-1, the central flower pistillate (or abortive) maturing after the lateral staminate flowers; staminate flower asymmetric, the sepals obovate-oblong, carinate, imbricate, the petals concave, valvate; stamens 6, the filaments connate, free at the apex, the anthers pendulous; pistillate flowers compressed, the perianth unchanged after anthesis, the sepals oblong, carinate, imbricate, the corolla trifid, the lobes stellately recurved, imbricate, the tube adnate to the disk and with it circumscissile above the base; ovary 3-celled, the style apical, elongate, the stigmas exserted; fruit ellipsoid-oblong, subcompressed, narrowed at each end, 1-seeded, the scar of the style basal, the pericarp thin, juicy, fibrous within, the fibers slender, adherent to the endocarp; seed oblong, erect, the testa smooth, brown, the hilum basal, the endosperm uniform, the embryo basal.

One other species is known, in Colombia.

**Asterogyne Martiana** Wendland ex Hook. f. in Benth. & Hook. Gen. Pl. 3: 914. 1883. *Geonoma Martiana* Wendl. Linnaea 28: 342. 1856. *G. trifurcata* Oerst. Vid. Medd. Kjöbenhavn 1858: 34. 1859. *Capoca* (Izabal). Figure 36.

Dense wet mixed lowland forest, at or little above sea level; Izabal. British Honduras, along the Atlantic coast to Panama; Colombia.

Plants small, often forming clumps or thickets, commonly acaulescent or nearly so but sometimes with a caudex 1.5 meters high and 4-5 cm. thick; leaves numerous, dull deep green, 1.3 meters long or shorter, deeply bifid at the apex, cuneately narrowed at the base, with about 40 nerves on each side; spadices 60-70 cm. long, the peduncle 40-50 cm. long, the rachis short, 4 cm. long or less, the

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FIG. 36. *Asterogyne Martiana*. a, Leaf ( $\times \frac{1}{5}$ ). b, Fruit ( $\times 4$ ). c, Fruiting branch ( $\times \frac{3}{4}$ ). d, Staminate flower ( $\times 11$ ).



branches 3-6, dull pale red, 10-20 cm. long; pits of the rachis 7-ranked, 9-10 mm. apart, the flowers white, fragrant; fruits spreading from the rachis, bluish black when ripe, smooth; seeds oval-ellipsoid, 6-9 mm. long, 4-5 mm. broad.

Called "monkey-tail" (British Honduras), "pacuquilla" (Honduras), "pato de gallo," "suíta" (Nicaragua). In general appearance the plant suggests a *Geonoma*, but from the Guatemalan species of that genus it is distinguished at once by its simple leaves, as well as by the fasciculate spadix branches, the rachis of the spadix being very short or almost obsolete.

### ASTROCARYUM Mey.

Rather small palms, the slender trunk armed with irregularly spaced, long, stout, compressed spines; leaves large, irregularly pinnatisect, the petiole short, the sheath short and open; spathes 2, borne at the base of the leaf cluster, white-lanate, covered with slender needle-like spines; spadix rather small, branched, the flowers monoecious in the same spadix, the staminate portions of the branches soon withering and falling, the basal flower of each branch pistillate, larger than the staminate flowers, the upper flowers all staminate and densely crowded; pistillate calyx cupuliform, the corolla urceolate, tridentate, bearing within 6 small, free or united staminodia; ovary ovoid, 3-celled, the 3 stigmas short, the cells 1-ovulate; staminate calyx small, triangular, the 3 petals short-stipitate, thick and fleshy, valvate; stamens 6, the filaments thick, the anthers dorsifixed, linear, sagittate at the base; fruit rather large, rostrate, 1-seeded, ovoid, spiny, the pericarp fleshy, fibrous within, the endocarp thin-osseous, 3-pored at the apex, the pores stellate-fibrous, the fertile pore apical; embryo apical; endosperm simple.

The genus consists of about 48 species.

***Astrocaryum mexicanum*** Liebm. Dansk. Vid. Selsk. Forh. 1845: 8. 1846 (type from Oaxaca). *A. Warscewiczii* Koch & Fint. Wochenschr. 1: 297. 1858. *Bactris Cohune* Wats. Proc. Amer. Acad. 21: 467. 1886 (type from "Chocón forests," Izabal). *A. Cohune* Standl. Trop. Woods 21: 25. 1930. *Hexopetion mexicanum* (Liebm.) Burret, Notizbl. Bot. Gart. Berlin 12: 156. 1934. *Lancetilla*; *Güis-coyol*; *Warree cohune*, *Cohune* (English-speaking negroes of North Coast and British Honduras). Figure 37.

Common and often abundant in dense wet mixed lowland forest of the northern departments, usually on well-drained land, chiefly on hillsides, 400 meters or lower; Petén; Alta Verapaz; Izabal. Southern Mexico (Oaxaca, Tabasco); British Honduras; Atlantic lowlands of Honduras.

Trunk slender, 1.5-5.5 meters high, 2.5-4.5 cm. in diameter, armed with very numerous, spreading, stout spines, these compressed and 2-edged, blackish, 3-5 cm. long or longer, arranged in more or less regular whorls; leaves a meter long or larger,



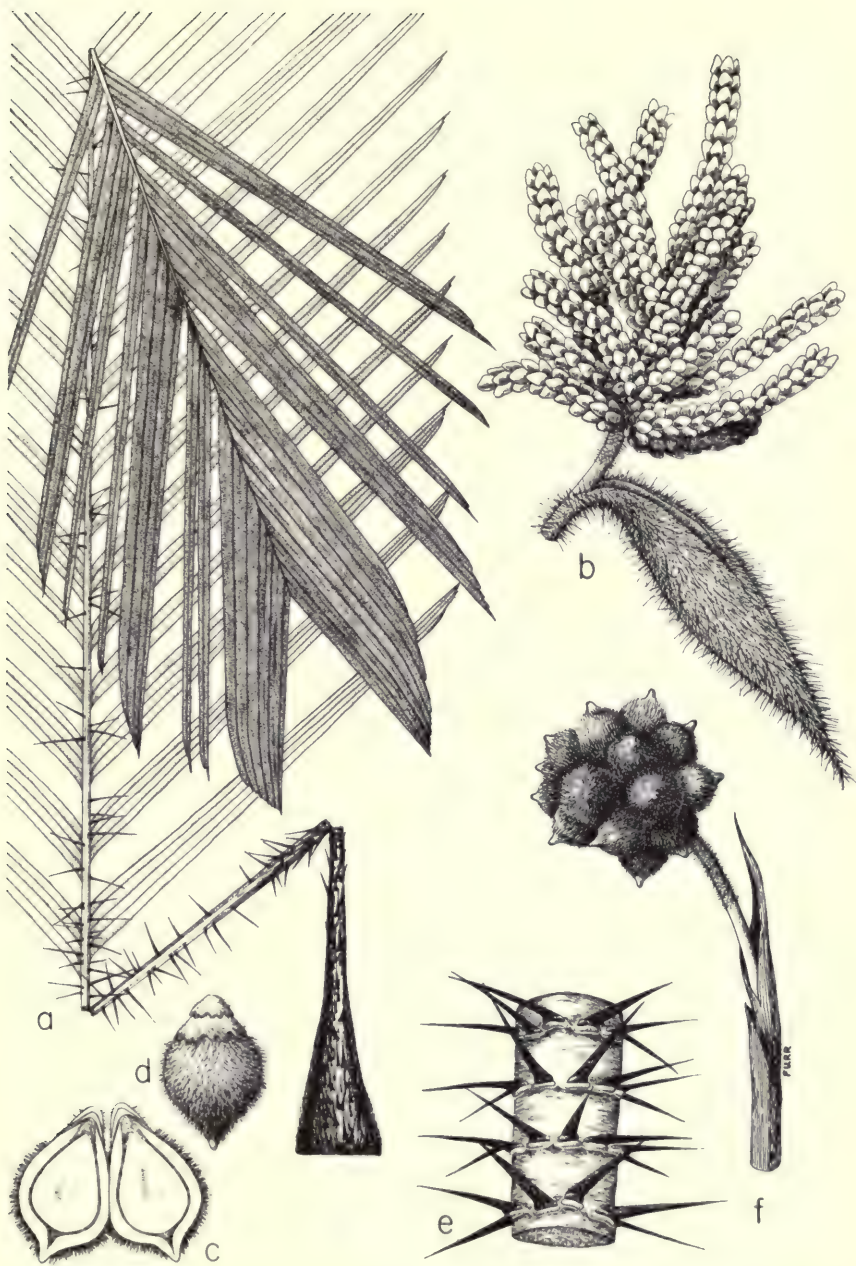


FIG. 37. *Astrocaryum mexicanum*. *a*, Leaf ( $\times \frac{1}{7}$ ). *b*, Inflorescence with spathe ( $\times \frac{1}{5}$ ). *c*, Longitudinal section through fruit ( $\times \frac{3}{4}$ ). *d*, Fruit ( $\times \frac{3}{4}$ ). *e*, Portion of spiny trunk ( $\times \frac{2}{5}$ ). *f*, Fruiting cluster ( $\times \frac{1}{3}$ ).

glaucous beneath, the petiole and rachis more or less tomentose and armed with long needle-like spines, the segments broad or narrow, very unequal, as much as a meter long, sparsely aculeolate on the margins; spathes 20–30 cm. long, caudate-acuminate; staminate calyx densely lanate, the petals lanceolate, united at the base, 4 mm. long; pistillate calyx and corolla aculeolate, coriaceous, the corolla 12–16 mm. long, the calyx almost half as long; fruits very numerous in each spadix, obovoid, about 5 cm. long, 2–2.5 cm. broad, rostrate, densely covered with short slender spines; seed obovoid, acute at the base, rounded at the apex, 2.5 cm. long.

This unpleasantly armed palm often forms a dense undergrowth, especially on hillsides, in the dark forests of the Atlantic lowlands, the very numerous, sharp-tipped spines being a constant menace to any one pushing through the thickets. Watson states that the name “warree cohune” is given because of the resemblance of the spiny covering of the fruit to the bristles of the common peccary (called “warree” by the negroes of the Atlantic coast). He states also that the kernels of the fruits are edible, with a flavor similar to that of coconut. The common Spanish name “lancetilla” alludes to the lance-like spines.

### BACTRIS Jacquin

*Reference:* Burret, *Repert. Sp. Nov.* 34: 167, 237, 241. 1934 (including *Guilielma* Martius and *Pyrenoglyphis* Karsten).

Low or tall palms, abundantly armed with short or long spines, the stems solitary or forming dense clumps or colonies, the stems or trunk annulate; leaves terminal or scattered along the upper part of the stem, equally or unequally pinatisect, the sheath elongate, spiny; spathes 2, longer than the spadix, cymbiform or fusiform; spadix simple or simply branched, inserted among the leaves; flowers monoecious in the same spadix, sessile, the lower ones ternate with the middle flower pistillate, or the sexes irregularly scattered; staminate calyx annular, urceolate, or 3-parted; stamens 6, 9, or 12, included, the filaments subulate, the anthers linear, affixed by the bifid base, erect; pistillate calyx various, the corolla longer than the calyx or of the same length, tridenticulate at the apex, the staminodia free and dentiform, or united in a ring; ovary 3-celled, the 3 stigmas short, sessile, finally recurved; fruit ovoid, subglobose, or oblong, 1-celled and 1-seeded, the stigmas terminal, the pericarp hard and almost ligneous or fleshy and juicy, the endocarp osseous, 3-pored near the apex or above the middle; seed pendulous below the apex of the cell, the raphe reticulate, the endosperm uniform, corneous, the embryo opposite one of the pores.

Nearly 200 species are known, distributed almost throughout tropical America but mostly in South America. A few species are found in Mexico, and more occur farther south in Central America. It is probable that others may be found in Guatemala, but they have not been collected.

Many of the species are more offensively armed, perhaps, than any other Central American plants, and that is saying a great deal.

Areas thus protected furnish admirable hideouts for all sorts of animals, particularly peccaries, agoutis, and other animals that feed on the fruits. The fruits, indeed, often are eaten by people, but they furnish a sorry sort of food. Those of some species do have a small amount of acidulous pulp that is not unpalatable, but others, which are eaten in extreme cases, have little that can be consumed except the very hard kernels, and these are eaten usually in the green and immature state, if at all. An exception is the pejibaye, *B. Gasipaes*, which is cultivated for its edible fruit.

Fruit purple at maturity, 3.5–4 cm. long; pistillate flowers with staminodes united in a ring and forming a conspicuous crenate cupule within the corolla in fruit.

*B. balanoidea*

Fruit red or yellow at maturity; pistillate flowers with inconspicuous free dentiform staminodes.

Fruit large, fleshy, edible; endocarp with numerous flat fibers radiating from the pores..... *B. Gasipaes*

Fruit small, about 1.5 cm. high and broad; endocarp lacking radiating fibers.

*B. trichophylla*

**Bactris balanoidea** (Oerst.) Wendl. in Kerch. Palm. 233. 1878. *Augustinea balanoidea* Oerst. Vid. Medd. Kjoebenhavn 1858: 39. 1859. *Pyrenoglyphis balanoidea* Karsten, Fl. Colomb. 2: 142. 1869. *Güisoyol*; *Viscoyol*; *Huiscoyol*; *Pahuac* (Petén). Figure 38.

Dry to wet thickets or forest, often in swampy ground, mostly at 250 meters or lower; Petén; Izabal; Santa Rosa; Escuintla; Retalhuleu; probably in all the Pacific coast departments. Tabasco and probably elsewhere in southern Mexico; doubtless in British Honduras, and extending southward to El Salvador and Panama.

Plants slender, the stems cane-like, cespitose, and usually forming dense, small or large clumps or thickets, generally 5 meters high or lower, the stems 2.5–5 cm. in diameter, densely armed with long and short, blackish spines, or the older stems almost naked; leaves evenly pinnatisect, mostly 1–1.5 meters long, dark green above, dull pale green beneath, wide-spreading and more or less decurved, the slender petioles 45–60 cm. long, ferruginous-pubescent and armed with spines 2.5–7.5 cm. long; leaf segments 30–40 pairs, subopposite or the lower ones alternate, 2–5 cm. apart, 25–45 cm. long, puberulent beneath, the margins setulose; spathe 20–35 cm. long, densely spiny; spadix with 10–12 simple branches; fruit cream-colored, probably becoming purple, 3.5–4 cm. long and 1–2.5 cm. thick, obtuse or rounded and apiculate at the apex; calyx persistent, 8–11 mm. high; endosperm surrounded by coarse hair-like fiber, about 3 cm. long, black.

Burret considers it doubtful that this differs from *B. major* (Jacq.) Karst., which ranges from Panama to Venezuela. The small spadices of this palm are sometimes used in Guatemala for decorating *nacimientos*, according to Professor Ulises Rojas.





FIG. 38. *Bactris balanoidea*. *a*, Apical, median, and lower portions of leaf ( $\times \frac{1}{5}$ ). *b*, Fruit, side view ( $\times \frac{3}{4}$ ). *c*, Fruit, ventral view ( $\times \frac{3}{4}$ ). *d*, Entire leaf ( $\times \frac{1}{10}$ ). *e*, Fruiting branch with spathe ( $\times \frac{1}{5}$ ).

**Bactris Gasipaes** HBK. Nov. Gen. & Sp. 1: 302, *pl.* 700. 1816. *Guilielma Gasipaes* L. H. Bailey, Gentes Herb. 2: 187. 1930. *G. utilis* Oerst. Vid. Medd. Kjoebenhavn 1858: 46. 1859. *Pejibaye*.

Native from Costa Rica to Colombia, and perhaps southward to Peru; planted occasionally in Guatemala at low and middle elevations, particularly in the North Coast, also in Escuintla and at Antigua.

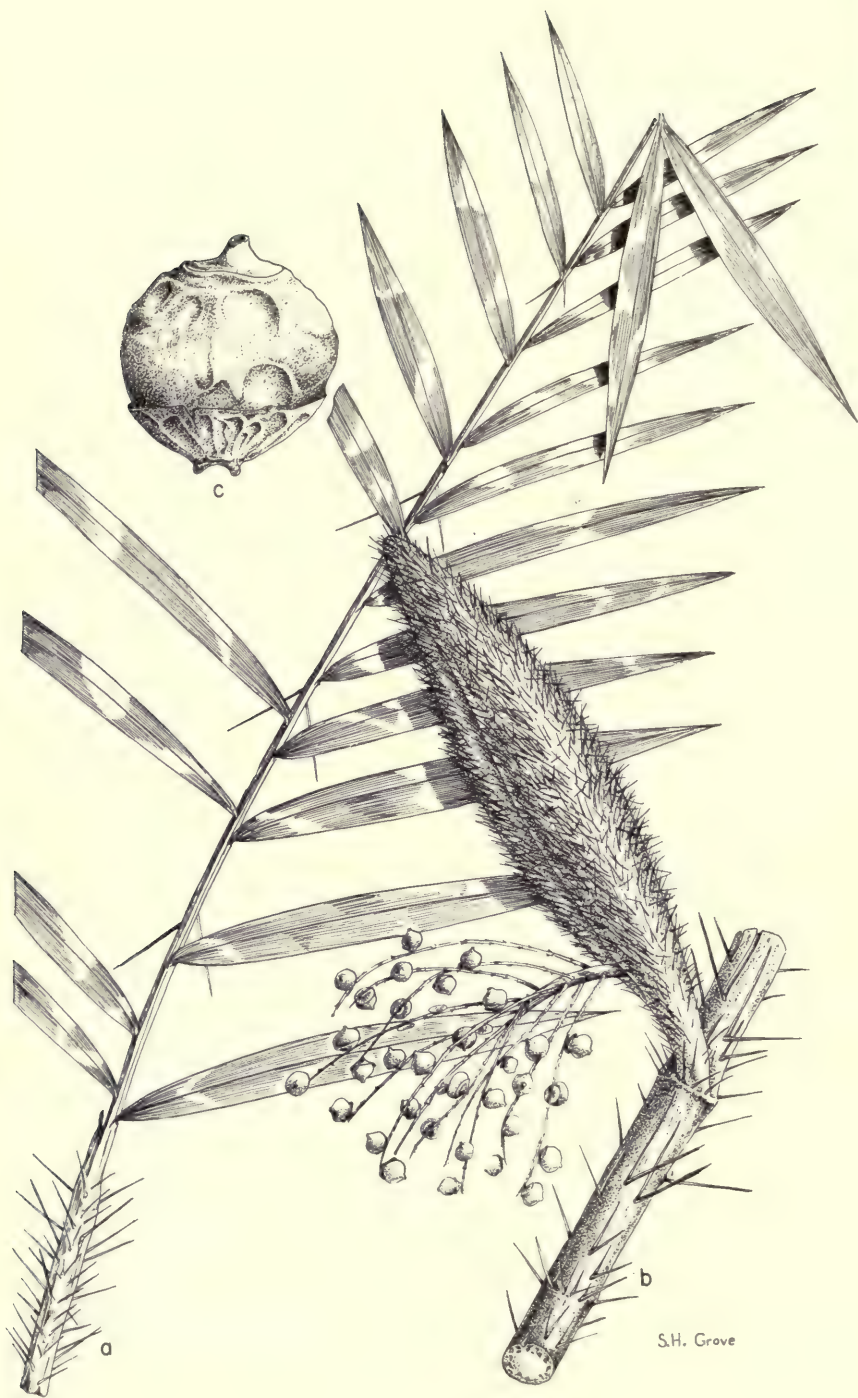
Trunk sometimes 8 meters high or more; fruits either red or yellow at maturity.

Apparently only a few plants of the pejibaye are in cultivation in Guatemala but in Costa Rica in certain regions they are abundant, both wild and cultivated. It is, however, unknown whether the apparently wild plants really are so, or only remnants of former plantations. In Costa Rica the palm is sometimes called "chonta," a word of South American (Quechua?) origin. In that country the pejibaye is one of the most highly valued plants because of its abundant fruits, which are much sought in the markets during their brief season. When boiled, the flesh of the fruit is mealy and sweet, in flavor and consistency somewhat suggesting boiled chestnuts (*Castanea*) or sweet potato. The very hard wood was used formerly by the Indians of Costa Rica for fashioning bows, arrow points, and other articles. Like other palms, this is an ornamental one for cultivation, the chief objection to it being the too great abundance of offensive spines on the trunk, which makes it unsuitable for planting too close to dwellings.

**Bactris trichophylla** Burret, Repert. Sp. Nov. 32: 113. 1933; 34: 214. 1934. *Güiscolol*; *Huscolol*. Figure 39.

Moist or wet thickets, often in wooded swamps, 900 meters or lower; Petén; Alta Verapaz; Izabal. British Honduras, the type from Stann Creek Valley, at 300 meters, *W. A. Schipp S368*.

Plants rather large and as much as 8 meters high, cespitose and often forming dense clumps or thickets, the stems 3-6 cm. in diameter; petioles 60 cm. long or more, furfuraceous-tomentose or glabrate, armed below with slender but stiff, blackish spines 4-7 cm. long; leaf blades 1.5-2 meters long, the rachis densely spiny below; leaf segments about 25 on each side, grouped, linear, mostly 30-60 cm. long and 2-4 cm. wide, acuminate, 2-3-nerved, deep green above, somewhat paler beneath and pubescent; upper spathe 24 cm. long, narrow-acuminate, fuscous-leprose, not at all tomentose, armed with slender spines 5-10 mm. long; peduncles about 11 cm. long, pale-tomentose, densely spiny, the branched portion 16 cm. long, the branches about 40 and 8-12 cm. long, fuscous-furfuraceous; pistillate calyx 3.5 mm. broad, with 3 very short, acute teeth, the corolla obscurely 3-dentate; ripe fruit depressed-globose, mammillate, 1.5 cm. high and broad, glabrous; fruiting perianth 1 cm. broad.





This plant and *Bactris balanoidea* are much alike in the field and have in common their most outstanding and offensive characters, which commonly attract more attention than the differences by which botanists distinguish them. Both plants are known among the native people, who naturally do not distinguish the plants, by the name "huiscoyol" or "güiscoyol," a Nahuatl term signifying "spiny palm." They are abundant in the lowlands of Guatemala.

### BRAHEA Martius

*References:* H. H. Bartlett, The genus *Brahea*, Carnegie Inst. Wash. Publ. 461: 29–31. 1935; L. H. Bailey, Notes on *Brahea*, Gentes Herb. 4: 119–125. 1937; L. H. Bailey, *Brahea*, and an *Erythea*, Gentes Herb. 6: 177–197, f. 87–100. 1943; H. E. Moore, Some American Corypheeae, Gentes Herb. 8: 219–222. 1951.

Erect or decumbent, sometimes acaulescent, solitary or cespitose, medium-sized hermaphrodite palms, the trunk fibrous-roughened below, clothed with a shag of deciduous leaf sheaths near the apex; leaves palmate, the sheath soft fibrous, unarmed; petiole with entire or spinose-dentate margins, ligule present at base of the blade above, lacking below; blades flabellate to nearly orbicular in outline, very shortly costapalmate, regularly divided nearly to the middle or beyond into 1-nerved segments bifid at the apex; spadices interfoliar, equaling or exceeding the leaves, erect or arcuate, slender with several once- to thrice-branched primary divisions, the spathes tubular, sheathing the peduncle, primary and secondary branches; flowers small, solitary, sessile on tomentellous branchlets or immersed in thick tomentose branchlets; sepals 3, free, imbricate; petals 3, free or shortly united with stamen filaments at the base, valvate, foveolate; stamens 6, the filaments united in a ring at the base and adherent to the corolla, attenuate above; carpels 3, glabrous above, tomentose below and prominently so as fruit develops, lightly connate below, the styles connate in a conic beak stigmatic at the apex, the ovule basal and erect; fruit ellipsoid, the stigmatic scar subapical, abortive carpels basal, exocarp smooth or tomentose when young, mesocarp fleshy, endocarp crustaceous, fragile; seed ellipsoid or globose, the raphe narrow, endosperm homogeneous with an intrusion of the integument below the raphe, embryo lateral.

A small genus of perhaps eight species, all except the following confined to Mexico.

Flowers sessile or slightly elevated on slender tomentellous branchlets; leaves conspicuously waxy-glaucous below, the petioles unarmed. . . . . *B. prominens*  
 Flowers immersed in thickish densely tomentose branchlets; leaves not waxy-glaucous below, the petioles spinose-dentate along the margins. . . . . *B. dulcis*

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FIG. 39. *Bactris trichophylla*. a, Leaf ( $\times \frac{1}{10}$ ). b, Portion of trunk with fruiting branch and spathe ( $\times \frac{2}{5}$ ). c, Fruit ( $\times 3\frac{1}{2}$ ).

**Brahea dulcis** (HBK.) Martius, Hist. Nat. Palm. 3: 244. 1838. *Corypha dulcis* HBK. Nov. Gen. et Sp. 1: 300. 1816. *Apak* (Huehuetenango).

Open rocky hillsides, 800–1200 meters; Huehuetenango; Quezaltenango.

Plants to 6 meters high or somewhat more, the stems solitary or sometimes cespitose; leaves 50–70 cm. across, divided into 30 or more segments 2–3 cm. wide, the petioles to 75 cm. long or more, margined with small teeth 2–4 mm. high; blades green; inflorescences to 1 meter long or more, with several twice- to thrice-branched primary divisions, the ultimate branchlets densely yellow-brown tomentose and thickish, 5–15 cm. long, with solitary flowers imbedded in the tomentum; flowers about 2 mm. high, the sepals scarcely prominent, petals prominently canescent at the base and glabrous above; fruit to 17 mm. long when fresh but smaller when dry, ellipsoid, yellowish-brown.

**Brahea prominens** L. H. Bailey, Gentes Herb. 6: 192. 1943. *Palma*.

At 900–1600 meters; Alta Verapaz (limestone cliffs above Trece Aguas, *Cook & Doyle 3*); Huehuetenango(?).

Trunk erect, 10 meters high or less, as much as 30 cm. in diameter at the base; leaves about a meter broad, orbicular, silvery beneath, light green above, glabrous, divided to the middle or lower into about 50 narrow segments, the margins with few, very short filaments; midrib of the rachis continued about 15 cm. on the lower surface of the blade; petioles very long (about 180 cm.), glaucous, not toothed; spadix very long and in fruit exceeding the leaves and hanging beneath them, the almost cylindric, vaginate peduncle longer than the fruiting portion of the inflorescence, much branched, the ultimate branchlets 5–8 cm. long, slender, tomentellous; flowers 2–3 mm. long, sessile or slightly elevated on the branchlets; fruit straight or flattened on the ventral side, 16–17 mm. long, 10 mm. thick when fresh, smaller when dried, light dull yellow or greenish yellow, the outer pulp scant, the apex with a short oblique point, the cupule very small, with acute corolla lobes.

The species of *Brahea* are still imperfectly known. Specimens from Guatemala agree with *B. prominens* but it remains to be seen whether the species is distinct from the earlier *B. calcarea* Liebmann.

### CALYPTROGYNE Wendland

*Reference*: M. Dammer, Bot. Jahrb. 63: 131–140. 1930.

Plants unarmed, usually small and low, sometimes stoloniferous, the caudex short or elongate, annulate below; leaves terminal, unequally pinnatisect, the segments few, narrow or broad, long-acuminate, often falcate, plicate, with numerous nerves, the petiole short, the sheath short, open; spadices simple or branched from the base, long-pedunculate; spathes 2, narrow, the lower one much shorter than the peduncle, cleft at the apex, the upper deciduous, elongate, cleft its whole length;

flowers monoecious, inserted in pits in the rachis of the spadix, the lower bract forming a broad lip projecting from the pit, the flowers ternate, the middle one pistillate, rarely solitary or binate, the perianth glumaceous; staminate flower subsymmetric, compressed, the 3 sepals oblong or lanceolate, concave, 2 or all of them dorsally carinate or winged; petals connate at the base into a stipe, ovate or spatulate, valvate; stamens 6, the filaments connate to form a tube, their apices free, the anthers sagittate, basifixed; pistillate flower broadly ovoid and strongly compressed, the perianth unchanged after anthesis, the petals valvate; ovary 3-celled, the style central, short or elongate, the stigmas recurved; fruit oblong or obovoid, 1-seeded, the scar of the style basal, the pericarp fleshy and fibrous; seed oblong or subglobose, slightly compressed, the hilum basal, the branches of the raphe inconspicuous, the endosperm uniform (not ruminate), the embryo basal.

About 11 species are known, ranging from southern Mexico to Brazil and Peru. A few others are found in other parts of Central America.

**Calyptrogyne Donnell-Smithii** (Dammer) Burret, Bot. Jahrb. 63: 133. 1930. *Geonoma Donnell-Smithii* Dammer, Bot. Jahrb. 36, Beibl. 80: 32. 1905. *Capoca*; *Güiscoyol* (doubtless an erroneous name, belonging properly to *Bactris* and *Pyrenoglyphis*); *Coroz*. Figure 40.

Dense wet mixed lowland forest, sometimes in *Manicaria* swamps, 600 meters or less, mostly at or near sea level; Izabal; perhaps endemic but to be expected in British Honduras and Honduras.

Plants small, acaulescent or with a very short caudex; leaves 1 meter long or more, the petiole short, 40 cm. long or usually much shorter, the blades dull deep green, unequally pinnatisect, the segments linear or broader, 35–45 cm. long, the blade with about 24 nerves on each side; inflorescence simple, the peduncle very slender, greatly elongate, stiff but flexible; lower spathe 26 cm. long or more; rachis of the spadix dull salmon-red to dark red, about 25 cm. long and 7 mm. thick, glabrous, the pits 7-ranked; staminate sepals 4.5 mm. long, the pistillate 4 mm. long; fruits ascending along the rachis (not divaricate), globose-oval, black at maturity, about 8 mm. long when dried, larger when fresh.

This palm has been reported from Guatemala under the name *Geonoma Olfersiana* Klotzsch, which belongs to a true *Geonoma* native in Brazil.

## CARYOTA L.

Plants unarmed, monocarpic, the trunk stout and tall, annulate; leaves very large, disposed in a terminal, often somewhat elongate crown, bipinnatisect, the numerous segments half-fan-shaped or wedge-shaped, dentate at the apex; margins of the leaf sheaths fibrous; spadices often alternately staminate and pistillate, short-pedunculate, the branches elongate and pendulous; spathes 3–5, incomplete, tubular; flowers rather large, monoecious in the same or different spadices which are inserted among the leaves, ternate with the middle flower pistillate, or the staminate flowers solitary, the spadices fastigiatly branched; staminate sepals rounded,





FIG. 40. *Calyptrogyne Donnell-Smithii*. *a*, Inflorescence ( $\times \frac{2}{3}$ ). *b*, Leaf ( $\times \frac{1}{3}$ ). *c*, Unopened flower ( $\times 5$ ). *d*, Staminal portion of flower ( $\times 15$ ). *e*, Fruit with attachment to rachis ( $\times 27$ ).

coriaceous, imbricate, the petals linear-oblong, valvate; stamens numerous, the anthers linear, affixed by the bifid base; pistillate flowers smaller than the staminate, subglobose, the perianth scarcely accrescent after anthesis, the sepals rounded, broadly imbricate, the petals coriaceous, rounded, connate at the base, valvate above; ovary 3-celled, the stigma trilobate, sessile, the ovules basal, erect; fruit globose, 1-2-seeded, the stigma terminal, the pericarp thin, coriaceous; seed subglobose, the hilum basal, the branches of the raphe sunk in channels, the endosperm ruminate, the embryo dorsal, excentric.

The genus consists of about a dozen species in tropical Asia and East Indies.

**Caryota mitis** Loureiro, Fl. Cochinch. 569. 1790. *Cola de pescado*.

Native of southeastern Asia; occasionally planted for ornament in Guatemala, at low or middle elevations.

Trunk often 5-8 meters high or more and 10-13 cm. in diameter; petioles, leaf sheaths, and scapes scurfy-villous; leaves 1-3 meters long, the numerous pinnae very obliquely cuneiform, irregularly dentate, the upper margin acute.

**Caryota urens** L. Sp. Pl. 1189. 1753.

Native of southeastern Asia and Malaysia; like the preceding species, planted for ornament.

Trunk thicker and taller than in *C. mitis*, becoming 25 meters tall and 45 cm. in diameter; leaves 5-6 meters long and 3-3.5 meters wide, the pinnae 1.5-2 meters long, recurved and drooping, the leaflets very obliquely truncate, 10-20 cm. long, acutely serrate, the upper margin caudately produced.

In Asia called "wine palm" and "toddy palm," being the source of a palm wine that is highly esteemed there. Both species are known in Florida, where they are sometimes planted, by the name "fishtail palm." They are easy of recognition because of their bipinnatisect leaves, which are large and broad, numerous, and handsome in appearance. In Guatemala these palms are seen mostly in the lowlands, where they often are planted in the parks. Because of the appearance of the leaf segments, they are often referred to as "palma comida por las ratas."

## CHAMAEDOREA Willdenow

*Reference:* Burret, Notizbl. Bot. Gart. Berlin 11: 724. 1933.

Plants unarmed, erect or procumbent, rarely scandent, the stems solitary or caespitose, very slender, green, annulate; leaves simple and bifid or rarely rounded at the apex, or variously pinnatisect, the segments broad or narrow, few or numerous, often somewhat oblique or sigmoid, acuminate, plicate-nerved, the petiole

usually slender and cylindric, the sheath short or elongate, tubular; spadices borne among or below the leaves, simple or paniculately branched, the peduncle short or elongate, the branches sparsely or densely flowered; spathes 3 or more, elongate and sheathing the peduncle, cleft at the apex, coriaceous or membranaceous, more or less persistent; flowers dioecious, sessile or subimmersed in the spadix, small or minute, ebracteate and ebracteolate; staminate calyx cupuliform, entire, 3-lobate, or 3-parted, the 3 petals free or variously connate, the lobes or segments valvate; stamens 6, the filaments short, broad or subulate, the anthers dorsifixed, included, didymous or oblong; pistillate calyx like that of the staminate flower, the petals usually connate, valvate or imbricate; ovary 3-celled, the stigmas minute, recurved, the ovules solitary, basal, erect; fruit small, of 1 or sometimes 2-3 carpels, globose or oblong, the stigmas basal, the pericarp coriaceous or carnose, scarcely fibrous; seed erect, globose or ellipsoid, the small hilum basal, the branches of the raphe obscure, the endosperm cartilaginous, uniform, the embryo basal or dorsal.

About 100 species are known, ranging from central Mexico to Brazil and Bolivia. A good many others are found in southern Central America, especially in Costa Rica (16 species) and Panama (19 species). Although Burret has done much to establish some order in the genus, most of the species still are known from only a few specimens, and their classification is still far from satisfactory. Burret recognizes as distinct from *Chamaedorea* the genera *Collinia* (*C. elegans*), *Eleutheropetalum* (*Chamaedorea Ernesti-Augustii* and its relatives), and *Dasystachys* (*Chamaedorea Deckeriana*). The differences stressed, however, do not seem of generic importance in a genus where variation in floral morphology is considerable. It therefore seems more practical, at least, and probably more in accordance with general taxonomic custom, to treat those genera as synonymous with *Chamaedorea*. O. F. Cook has gone still farther, separating from *Chamaedorea* as genera numerous forms that would be treated by most botanists as species, an extremity of splitting that has not been surpassed even in the Cactaceae or Leguminosae.

The *Chamaedoreas* are of considerable economic importance throughout Central America, but in Guatemala more than elsewhere. In the markets there are sold vast quantities of the unopened staminate inflorescences (the pistillate ones are not used), that is, the twisted and folded spadix enclosed by the closely appressed, green spathes, the whole looking like a green ear of maize enclosed in its husks. The spadices are white or whitish, tender, and when served on the table are of attractive and agreeable flavor. They constitute, indeed, an excellent vegetable and one that is very popular locally. The spadices of some species are too bitter to be eaten, and all or most of them have a slight bitterness that is rather agreeable. Sometimes they are served raw as a salad but more often they are cooked with eggs, or prepared in other ways, much as aspara-



gus is treated. In some regions, particularly in the Occidente, there is prepared from *Chamaedorea* a quite different dish or vegetable, called "bojón." This consists of the pith of the younger stems, and perhaps includes at times the leaf buds. It is eaten either raw, sometimes as a salad, or cooked in various fashions. The senior author has had it served on the table baked, and it proved to be succulent and well flavored, much better, in fact, than even the ordinary pacaya.

The spadices of different species of *Chamaedorea* as they appear in the markets differ greatly in appearance. The pacayas (the name "pacaya" is applied to both the plant and its edible spadices, or the plant is sometimes called "pacayo") of Cobán (*C. Tepejilote*) are much larger and finer than those of other localities, and when piled on the ground resemble green ears of field corn. Such spadices, naturally, give a larger amount of edible matter than those of smaller size, and the Alta Verapaz pacayas on that account are shipped to other parts of the country. We have seen large trucks loaded with them starting for the Guatemala market. In Alta Verapaz the pacaya has been a cultivated plant probably for centuries, and the plants have increased in size as the result of cultivation, being much taller and stouter than plants of the same species found in the mountains. Some of them are taller than the one-storied houses. While the large pacaya is referred to commonly as the pacaya of Cobán, the plants actually are grown mostly far from that city, and they are especially abundant in Tactic and San Cristóbal, where there are veritable forests of them in some of the small *fincas*.

Some species of *Chamaedorea* have spadices so small that they are worthless for food, but most of those eaten in Central America are much smaller than those of *C. Tepejilote*. Almost all the species may be found in cultivation at times in patios or gardens, and all of them are ornamental. The larger plants are valued more for their food value than for ornamental purposes, and many patios have clumps of the plants from which the inflorescences are gathered for the table. The spadices are produced almost if not quite throughout the year, and are one of the vegetables that may be procured at all seasons. The larger leaves are much used for decorations on festive occasions, both inside and out of doors, and they are especially in favor for forming *arcos* across streets and roads. The juice of ripe *Chamaedorea* fruits is intensely irritating to the skin, causing burning and itching sensations. Mischievous boys sometimes push through crowds of people, rubbing the juice on their arms, much to the discomfort of persons so molested.

The general name in Guatemala for species of *Chamaedorea* is *pacaya*, and this term appears in many geographic names, especially that of the Volcán de Pacaya. The name "tepejilote," current in Mexico, is seldom heard in Guatemala, but it is said to be applied to one of the small plants with very bitter spadices. Other names are "capuca," "chichicuilote," "bojón," and "molenillo."

Flowers of both sexes with petals united, opening through a terminal 3-angled pore, the corolla in pistillate flowers splitting into 3 rather strongly nerved equal lobes in fruit; pistillodes of staminate flowers expanded into a broad 6-angled cap with anthers adherent to the column below. . . . . *C. elegans*

Flowers of both sexes with petals distinct above a sometimes shortly united base, or with staminate petals connate at the apex and the corolla opening by lateral slits.

Petals bright orange at maturity in both sexes, the pistillate valvate at anthesis (probably lightly imbricate in bud basally) with a thin basal half and a fleshy cucullate upper half, the latter deciduous in fruit; pistillode of staminate flowers expanded into a broad 6-lobed cap, the anthers deeply bifid at the apex; leaves simple; inflorescence long-pedunculate.

*C. Ernesti-Augustii*

Petals yellow, green, or brownish at maturity in both sexes, the pistillate imbricate and persistent in entirety about the fruit (except probably in *C. brachypoda*); pistillode truncate or attenuate, scarcely much expanded at the apex; leaves and inflorescences various.

Staminate flowers contiguous, densely crowded in 4-7 rows along the branches of the inflorescence and lightly immersed in shallow elliptic depressions; pistillate flowers with the calyx either very small and annular or cupular and nearly as long as the petals.

Pistillate inflorescence with few to many slender branches, the flowers with a very low annular calyx and not densely crowded; staminate flowers with the calyx very low and annular, not prominent in bud.

*C. Tepejilote*

Pistillate inflorescence spicate, furcate, or with few thick branches, the flowers very densely crowded, with cupular calyx nearly half as long as the petals; staminate flowers with the calyx well developed, cupular and prominent in bud.

Pistillate inflorescence spicate or furcate. . . . . *C. Arenbergiana*

Pistillate inflorescence with about 8 branches. . . . . *C. Casperiana*

Staminate flowers distinct and separated, at least in bud (at anthesis dense in *C. ascendens*); pistillate flowers not densely crowded and with a well-developed imbricate or 3-lobed calyx.

Petals of staminate flowers connate at the tips, the corolla opening by lateral slits; staminodes lacking in pistillate flowers.

Perianth of both sexes nerveless or essentially so; leaves simple; inflorescences with 1-6 branches; fruit maturing black. . . . *C. geonomaeformis*

Perianth of both sexes very strongly nerved when dry; fruit orange or yellow, at least when immature, in some species maturing purple-black.

Flowers of both sexes essentially superficial in slight depressions along the branches of the inflorescence, the sepals generally united and scarcely imbricate-lobed in bud; inflorescence of both sexes with 5

- (rarely 4) or more branches; petiole elongate, usually exceeding the leaf sheath in length.
- Plants of Alta Verapaz at elevations of 1350–1600 meters; fruit unknown; see discussion of species. . . . . *C. micrantha*
- Plants of western Guatemala, or of low elevations (mostly less than 300 meters) in eastern Guatemala.
- Fruit sickle-shaped, acute; branches of the staminate inflorescence few (4–7). . . . . *C. falcifera*
- Fruit globose or subreniform and obtuse; branches of the staminate inflorescence numerous.
- Fruit globose; leaves small with generally 5 pinnae on each side of a rachis 30–40 cm. long. . . . . *C. Aquilariana*
- Fruit subreniform, obtuse; leaves large with usually 7–8 pinnae on each side of a rachis 45–65 cm. long. . . . . *C. neurochlamys*
- Flowers of both sexes distinctly sunken in prominent depressions along the branches of the inflorescence; inflorescences of both sexes spicate, furcate, or trisect; staminate sepals nearly completely imbricate in bud; petioles short, seldom equaling, very rarely exceeding the sheath in length.
- Leaves thin, simple or generally pinnate below broad terminal lobes, with 1–3 secondary nerves clearly evident between the primary nerves of the terminal lobes, the rachis generally 8.5 cm. long or more, very rarely only 6 cm. long; pistillate flowers prominently sunken, the pits deep in fruit; caudices erect, solitary, with a cluster of slender prop or prop-like roots. . . . . *C. Rojasiana*
- Leaves rather thick, simple, the secondary nerves not evident, the rachis generally 5 cm. long or less; pistillate flowers lightly sunken, the depressions shallow in fruit; stems decumbent and rooting at the nodes, then erect, plants possibly rhizomatous and colonial. . . . . *C. simplex*
- Petals of staminate flowers free at the apex, the perianth of both sexes nerveless or with few nerves when dry; fruit green when immature, maturing black or glaucous.
- Branches of the inflorescence undulate, especially in bud, the flowers of both sexes laterally compressed, longer than broad, slightly to distinctly impressed in curves of the branches.
- Pistillate flowers with staminodes, the calyx 3-lobed. . . . . *C. nubium*
- Pistillate flowers lacking staminodes, the calyx of essentially imbricate sepals. . . . . *C. Skutchii*
- Branches of the inflorescence not undulate, though sometimes ridged and angled; flowers essentially superficial, not laterally compressed.
- Inflorescences of both sexes rather profusely branched, generally with 10 or many more branches (only 3–6 in pistillate plants of *C. vulgata* but these stout and to 27 cm. long); staminodes lacking in pistillate flowers; stems robust, erect to scandent in mature plants, with the internodes usually elongate.
- Pinnae rhombic-lanceolate and strongly sigmoid, 6–9 on each side of a pale-backed rachis; flowers drying black in both sexes. . . . . *C. oblongata*
- Pinnae linear to lanceolate, not sigmoid but sometimes falcate toward the apex, generally more than 10 on each side of a green-backed rachis; flowers not drying black.



- Branches of the inflorescence short, stiff, spinose-tipped, prominently ridged and angled. . . . . *C. aequalis*
- Branches of the inflorescence not ridged, angled, and pointed.
- Pinnae narrowly linear, about 30 on each side of the rachis; plants colonial. . . . . *C. Schippii*
- Pinnae lanceolate; plants solitary or cespitose.
- Inflorescence breaking through the long sheaths on a sprawling, clambering, or scandent stem, subtended by 3-4 spathes, the uppermost spathe incomplete and often the only one apparent; leaves variable but at maturity to 3 meters long with reflexed pinnae narrowed to a very slender callose-indurate base. . . . . *C. elatior*
- Inflorescences erect from the orifices of the sheaths, subtended by about 6 spathes.
- Pinnae with the midnerve prominent above, yellow and shining below, the remaining nerves less conspicuous; pistillate spadix elongate with 18-25 branches only 6-9 cm. long. . . . . *C. carchensis*
- Pinnae with the midnerve and 2 secondary nerves on each side prominent, yellowish and shining below; pistillate inflorescence with few (3-6) elongate branches. . . . . *C. vulgata*
- Inflorescences of both sexes spicate or with few (rarely as many as 10) branches; staminodes present in pistillate flowers (except *C. quetzalteca*?); stems slender and generally low, usually densely annulate.
- Inflorescences breaking through the persistent sheaths at the nodes (see also *C. digitata*).
- Peduncles of the inflorescence short, scarcely as long as the few short branches.
- Leaves pinnate; plants robust, cespitose. . . . . *C. erumpens*
- Leaves simple; plants slender, low and colonial. . . . . *C. brachypoda*
- Peduncles of the inflorescence elongate; plants solitary.
- Pistillate inflorescence spicate; staminate with 2-4 very densely flowered pendulous branches. . . . . *C. adscendens*
- Pistillate inflorescence with 4-10 branches; staminate with 8-10 branches.
- Inflorescences of both sexes with about 10 branches; central pinnae to 20 cm. long, 3.5 cm. wide. . . . . *C. pulchra*
- Pistillate inflorescence with 4 branches; staminate with 8 branches; central pinnae to 15 cm. long, 2 cm. wide. . . . . *C. parvisecta*
- Inflorescences erect, emerging through the orifices of the sheath or from the base of the stem.
- Leaves rounded and undivided at the apex. . . . . *C. Tuerckheimii*
- Leaves cleft at the apex.
- Petiole densely rugose; leaves entire or pinnate, then with pinnae prominently auriculate at the base. . . . . *C. tenerrima*
- Petiole smooth or only slightly verrucose above; pinnae not prominently auriculate.
- Leaves simple; inflorescence very long-pedunculate (80-100 cm.), subtended by 9-10 closely sheathing spathes. . . . . *C. stricta*

Leaves pinnate; inflorescence less than 30 cm. long with 7 or fewer spathes.

Leaf sheaths elongate, cylindric, closely sheathing the caudex.

Pinnae about 16 on each side, falcate, prominently 3-5-nerved.....*C. quetzalteca*

Pinnae about 7 on each side, more or less sigmoid, only the central nerve prominent.....*C. digitata*

Leaf sheaths short, open, imbricate.

Pinnae markedly sigmoid, short and broad (generally 4 times as long as broad or less), about 10 on each side of the rachis.....*C. Pachecoana*

Pinnae lanceolate-attenuate or falcate-lanceolate, generally about 5 times as long as broad.

Fruit oblong-ellipsoid; pinnae 10-14 on each side, prominently 3-nerved.....*C. stenocarpa*

Fruit globose or ovoid; pinnae about 8 on each side, the central nerve more prominent than the others.

*C. Lehmannii*

**Chamaedorea adscendens** (Dammer) Burret, Notizbl. Bot. Gart. Berlin 11: 737. 1933; 11: 1039. 1934. *Kinetostigma adscendens* Dammer, Notizbl. Bot. Gart. Berlin 4: 172. 1905. *Tuerckheimia adscendens* Dammer ex Donn. Smith, Enum. Pl. Guat. 7: 53. 1905, nomen.

Moist or wet, mixed forest, often in rocky places, 700 meters or lower; Alta Verapaz (type from summit of Cerro Hacoc, near Cubilgüitz, *Tuerckheim* 8770; collected at other localities in the same general region); Izabal. British Honduras.

Plants slender, 2.5 meters high or lower, sometimes flowering when acaulescent or nearly so, the caudex commonly about 1 cm. thick; leaves few, generally about 6, dull green with a velvety appearance, the cylindric sheath 6 cm. long or shorter, the petiole 7 cm. long or more, the rachis short; leaves variously and often unevenly divided into 1-6 segments on each side, the longest 16 cm. long and 2.5 cm. wide with a prominent but scarcely elevated midnerve pale below and numerous inconspicuous nerves of lesser orders, or the terminal pair often much broader and 2-9-nerved, or sometimes one side undivided; inflorescences solitary and penetrating the sheaths at the nodes, then divaricate-ascending to erect, the staminate peduncle slender, as much as 40 cm. long, the spathes 8-9, slender, the rachis very short, the branches 2-5, slender, as much as 15 cm. long and pendulous with cream-colored nerveless flowers 2.5 mm. long superficial on the branchlets in a densely spiralled arrangement, the calyx pale, shallowly 3-lobed, the petals briefly connate at the base, distinct and not united above, the anthers apically entire and longer than the filaments, pistillode columnar; pistillate spadix long-pedunculate, simple, the floriferous part about 10 cm. long, slender, the nerveless flowers remote and scarcely sunken, the calyx annular, briefly 3-lobed, about 1 mm. high, petals very shortly

connate basally, broadly imbricate above, acute, staminodes present, abortive carpels adherent to the corolla in fruit; fruit black at maturity, globose or ovoid-globose, 8 mm. long; seed 6 mm. long.

A specimen of this species (*Schipp 1223*, Gray Herbarium) is anomalous in having sterile(?) pistillate flowers among the predominant staminate ones in a typical staminate spadix. Staminate spadices at maturity are very densely flowered, superficially resembling such species as *C. Arenbergiana* or *C. Tepejilote* but in bud the flowers are clearly distinct.

***Chamaedorea aequalis* Standl. & Steyerl. Field Mus. Bot. 23: 196. 1947.**

Moist or wet, mixed forest, sometimes growing with *Liquidambar*, 1600–2000 meters; endemic; Huehuetenango (type from Cerro Negro, 2 miles west of Las Palmas, Sierra de los Cuchumatanes, *Steyermark 51666*); Sololá (southern slopes of Volcán de Atitlán); Quezaltenango (slopes of Volcán Zunil).

Caudex erect, 3–4.5 meters high, 1.5–2 cm. thick, the upper internodes 11–15 cm. long; leaf sheaths open and oblique, about 9 cm. long, prominently costate, the petiole to 19 cm. long, 3 mm. thick; leaf blades 37 cm. long and 23 cm. wide or larger; pinnae 17 or more on each side, thin, concolorous, regularly disposed, somewhat lustrous, the apical ones not wider than the others, connate at the base, the pinnae all narrowly lanceolate, not sigmoid, 13–30 cm. long, 1.5–4 cm. wide, narrowly and equally attenuate-acuminate, gradually narrowed to the very narrow base, mostly 3-nerved, the nerves not keeled above, the secondary nerves numerous, almost as stout as the primary ones; peduncles ascending or suberect from below the leaves, slender, 21–30 cm. long, scarcely more than 2 mm. thick above; spathes 6, tubular, imbricate, the lower ones very short, the middle ones about 12 cm. long, 5 mm. in diameter, appressed; staminate spadix with about 25 branches from an axis 9.5 cm. long, the branches spreading, sharply angled and ridged, to 12 cm. long, the lower ones again once forked or branched, the nerveless flowers superficial, about 3.5 mm. high, the calyx pale, shallowly 3-lobed, about 1 mm. high, petals valvate, not connate at the tips, the stamens with prominent filaments and anthers entire at the apex, pistillode nearly cylindric, rounded at the tip; pistillate spadix 10–13 cm. long and broad, the branches about 10, sharply angled and ridged, erect-patent, the lowest ones furcate or branched, the rest simple, 9–10.5 cm. long, slender, red in fruit, the flowers scarcely immersed, the fruits remote, spirally arranged; corolla explanate below the fruit, the petals equal, broadly ovate, 2 mm. long, nerveless, subapiculate, the calyx scarcely more than 2 mm. broad, the 3 lobes broadly rounded; staminodes lacking; fruit globose, 6 mm. in diameter when dry; seed almost as long as the fruit, globose, pale grayish brown.

This species is unusual among Guatemalan representatives of the genus in the clearly ridged branchlets of the inflorescence. In this respect it resembles *C. elegans* but is probably even more closely related to *C. Liebmannii* of Mexico.



**Chamaedorea Aguilariana** Standl. & Steyerm. Field Mus. Bot. 23: 196. 1947. *Chilak* (Huehuetenango); *Pacaya*; *Molinillo*.

Moist or wet, mixed, mountain forest, 600–2000 meters; endemic; Santa Rosa; Escuintla; Suchitepéquez; Chimaltenango; Quezaltenango (type collected in quebrada along the old road between Finca Pirineos and Patzulín, *Standley 86890 pro parte*); San Marcos; Huehuetenango.

Plants solitary, the caudex slender, erect, green, 1–3 meters high, 8 mm. thick, conspicuously annulate, the internodes mostly 1.5–2 cm. long; leaf sheaths 9–10 cm. long, 1–1.5 cm. broad, oblique at the apex; leaf blades oblong in outline, mostly 30–40 cm. long, the rachis very slender; 4–5 pinnae on each side, regularly distributed, alternate, the apical ones confluent, 18–20 cm. long and 2.5–5 cm. wide, thin, sigmoid, falcate-acuminate, slightly paler beneath, central and submarginal nerves prominent and very slightly keeled above, pale and shining below as are the 2–4 slender secondary nerves on each side; inflorescences borne among the leaves, subtended by 3–4 tubular, thin spathes 6–7 mm. in diameter, the peduncles 8–22 cm. long; staminate spadix with 11–14 slender pendulous branches about 12 cm. long from a short axis, floriferous for their whole length, the green, essentially superficial flowers strongly nerved when dry, 3.5 mm. high, rather densely spiralled, the calyx 0.75 mm. high, rather shallowly and not imbricately 3-lobed, the petals very shortly connate in a compressed linear base, expanded above and connate at their tips, the corolla opening by lengthwise slits, stamens with short filaments and oblong anthers entire at the apex, the pistillode 3-angled and truncate; pistillate spadix with 6–18 branches 6–10 cm. long from a short to moderate rachis, the green flowers 2 mm. high, strongly nerved when dry, loosely spiralled and essentially superficial, the calyx 1 mm. high, 3-lobed; petals imbricate, staminodes lacking; pistil ovoid, with sessile stigmas; fruit orange, perhaps darkening at full maturity, globose, 6 mm. in diameter.

Differences between *C. Aguilariana* and *C. concolor* of Mexico are few if any, and it is possible that further study will show them to be identical. The probable relationships to plants of this complex from Alta Verapaz are discussed with *C. micrantha*.

The name “molinillo” given to this and other species relates to the fact that the base of the stem with the cluster of stiff roots is used to stir coffee and other hot liquids. The species was named for Don José Aguilar, formerly Director of the Finca Nacional La Aurora.

**Chamaedorea Arenbergiana** Wendl. Index Palm. 66. 1854; Kerchove, Les Palmiers 75. f. 33. 1878; Bot. Mag. pl. 6838. 1885. *Spathoscaphe Arenbergiana* Oerst. Vid. Medd. Kjoebenhavn 1858: 30. 1859; Amér. Centr. 15. pl. 7, f. 29–37. 1859. *Nunnezharoa Arenbergiana* Kuntze, Rev. Gen. 2: 730. 1891. *Chim* (San Marcos). Figure 41.



FIG. 41. A, *Chamaedorea elegans*. B, *C. Ernesti-Augustii* (m,  $\times 1$ ). C, *C. Tepejilote*. D, *C. Arenbergiana* (k, calyx in bud; m,  $\times 1\frac{1}{3}$ ). a-g, staminate; h-n, pistillate: a, portion of rachilla ( $\times 2\frac{2}{3}$ ); b, flower ( $\times 6$ ); c, corolla ( $\times 6$ ); d, calyx ( $\times 6$ ); e, flower expanded ( $\times 6$ ); f, pistillode ( $\times 8$ ); g, stamens in front, back, and side views ( $\times 8$ ); h, portion of rachilla ( $\times 2\frac{2}{3}$ ); i, flower ( $\times 6$ ); j, corolla ( $\times 6$ ); k, calyx ( $\times 6$ ); l, pistil ( $\times 6$ ); m, fruit ( $\times 2$ ); n, perianth in fruit ( $\times 2$ ).



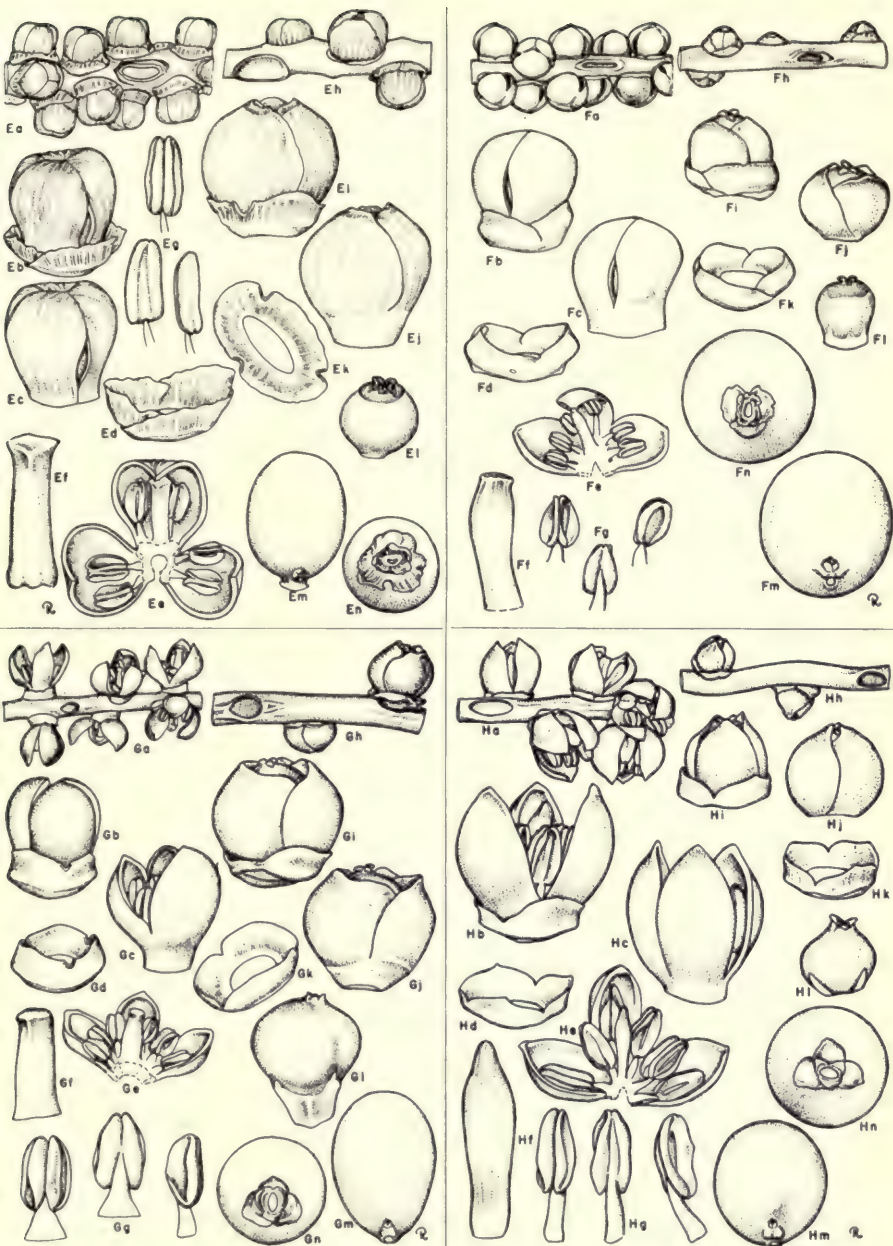


FIG. 41 (continued). E, *Chamaedorea Rojasiensis*. F, *C. geonomaeformis*. G, *C. oblongata*. H, *C. Pachecoana*. a-g, staminate; h-n, pistillate: a, portion of rachilla ( $\times 2\frac{2}{3}$ ); b, flower ( $\times 6$ ); c, corolla ( $\times 6$ ); d, calyx ( $\times 6$ ); e, flower expanded ( $\times 6$ ); f, pistillode ( $\times 8$ ); g, stamens in front, back, and side views ( $\times 8$ ); h, portion of rachilla ( $\times 2\frac{2}{3}$ ); i, flower ( $\times 6$ ); j, corolla ( $\times 6$ ); k, calyx ( $\times 6$ ); l, pistil ( $\times 6$ ); m, fruit ( $\times 2$ ); n, perianth in fruit ( $\times 2$ ).



Moist or wet, mixed forest, 300–1500 meters; described from cultivated plants believed to be of Guatemalan origin; Alta Verapaz; Izabal; San Marcos; Quezaltenango; Huehuetenango. Honduras to Panama. Represented in Herbarium of Chicago Natural History Museum by three type photographs (Negatives 20754, 2106, 25382).

Plants 4.5 meters high or lower, sometimes flowering while still acaulescent, the stems green, 2–3 cm. in diameter; leaves dark green, erect-spreading, 1–2.5 meters long, the sheath obliquely open at the apex, sometimes 40–45 cm. long, the petioles 35–45 cm. long; leaf segments 8–10 on each side of a pale-backed rachis, rather remote, with 5–8 prominent primary nerves keeled above, shining and pale below and numerous nerves of lesser orders, elongate-oblong or oblong-lanceolate, often somewhat falcate, very long-acuminate and drooping at the tips, the largest about 60 cm. long and 8–10 cm. wide, most of the segments smaller or at least much narrower, green on both surfaces; inflorescences arising beneath the leaves, subtended by 5 spathes, the staminate spadices 30–40 cm. long with 8–10 pendulous branches 12–15 cm. long, the brownish flowers crowded on the axis in 6 spiralling rows, the calyx gamosepalous, longer than the corolla and enclosing it in bud, about half as long at anthesis, shallowly 3-lobed, not prominently nerved, the corolla united with the stamen filaments and pistillode in a very short basal stipe but distinct with spreading valvate lobes 2.5 mm. long above, the stamens with prominent distinct filaments and anthers divaricate basally, pistillode columnar, apically 3-lobed, equaling the stamens; pistillate spadix usually simple, sometimes furcate, about 30 cm. long, the peduncle very thick, erect, much longer than the fruiting portion of the spadix, this usually 5–12 cm. long and about 1.5 cm. thick or broader, flowers very densely crowded in perhaps as many as 20 rows and somewhat sunken in the axis, the sepals connate in a shallowly 3-lobed membranous cup nearly as high as the broadly imbricate, scarcely nerved, shortly pointed petals, staminodes absent, pistil ovoid, 3-lobed with 3 short, recurved, sessile stigmas, the abortive carpels usually separating from the fruit and adhering to the perianth; fruits crowded, subglobose or transverse-oblong, about 12 mm. long and sometimes 19 mm. broad; seed oblong, 10–12 mm. long, 9–10 mm. broad.

Pistillate inflorescences of this species are generally simple or furcate, differing in this respect from *C. Casperiana*, with which it may eventually prove conspecific.

***Chamaedorea brachypoda*** Standl. & Steyerl. Field Mus. Bot. 23: 198. 1947.

Dense, wet, mixed, lowland forest, 150 meters or lower; endemic; Izabal (type collected between Bananera and La Presa, base of Sierra del Mico, *Steyermark* 39185; collected also between Virginia and Lago de Izabal and in the vicinity of Quiriguá).

Plants rhizomatous and colonial(?), the caudex slender, pale green, about 1 meter high, 6–7 mm. thick, the internodes 6–7.5 cm. long; leaf sheaths about 6 cm. long, tubular, 8 mm. broad, striate-nerved, oblique at the apex, more or less persistent, the slender petiole 9–10 cm. long; leaf blades simple, about 25 cm. long

and wide, cuneate-acute at the base, the rachis about 12 cm. long, pale below, the primary nerves 11-13 on each side, prominent and keeled above, the secondary nerves much more slender than the primary ones, the blade deeply bilobate at the apex, the lobes acute or short-acuminate, divergent at an angle of 90 degrees or more, about 16 cm. long and 10 cm. wide, almost concolorous; inflorescences breaking through persistent old sheaths at the node below the living leaves, the peduncle 3-5 cm. long, slender but stiff, ascending; spathes 6, very short, the lowest scarcely more than 8 mm. long, the uppermost as much as 2.5 cm. long, 4 mm. broad, acute or acuminate at the apex; branches of the staminate spadix 5-6, very slender, 9-10.5 cm. long, laxly flowered, the yellow flowers about 3.5 mm. high, scarcely immersed, the calyx 1 mm. high, shallowly 3-lobed, petals united for about 1 mm. at the base and adnate to the stamen filaments and pistillode in a short stipe, free, fleshy, valvate above and somewhat inflexed but not connate at the apex, the stamens with very short filaments, anthers subbasally attached and bifid apically for more than half their length, the pistillode sharply 3-angled, ventricose at or above the middle, narrowed to a truncate angled cap; pistillate spadix with 6-8 branches about 6 cm. long, the flowers in young bud slightly immersed, depressed-globose, with shallowly 3-lobed calyx; petals imbricate at the base, the apex deltoid and probably deciduous in fruit, staminodes present; immature fruit ellipsoid.

This species, if cultivated material corresponding with it is typical, is probably colonial with long slender underground rhizomes.

***Chamaedorea carchensis*** Standl. & Steyerl. Field Mus. Bot. 23: 199. 1947.

Known only from the type locality, wet rocky forest along banks of Río Carchá, between Cobán and San Pedro Carchá, Alta Verapaz, 1350 meters, *Standley 90160*.

Plants acaulescent; leaves large, the sheaths indurate, 12 cm. long, almost 2 cm. thick, narrowed to the petiole; petiole 1 meter long or slightly longer, narrowly sulcate, almost 1 cm. thick; pinnae about 15 on each side, subequal, regularly inserted, alternate, linear-lanceolate, the terminal ones scarcely wider or in young leaves twice as wide as the lower pinnae, the middle pinnae about 40 cm. long and 3.5 cm. wide, straight, not sigmoid, equally attenuate-acuminate, gradually narrowed to the base, the base itself 10-15 mm. wide, slightly indurate; pinnae conspicuously 1-nerved and with 2 more slender submarginal nerves, the secondary nerves very slender and inconspicuous; pistillate inflorescences arising from the very base of the plant, erect, the peduncles 34-50 cm. long, rather stout, 4 mm. thick near the apex; spathes 6, imbricate, appressed, 8-10 mm. broad, the lowest only 3.5 cm. long, the uppermost about 12 cm. long, oblique at the apex, obtuse and submucronate, densely striate-nerved; branched portion of the pistillate spadix 20-26 cm. long, 7-8 cm. broad, the rachis rather stout, 14-18 cm. long, the branches 18-25 and 6-9 cm. long, stout, green, arcuate-erect, sparsely flowered; flowers scarcely immersed, the alveolae 1-1.2 mm. long, orbicular or broadly oval; calyx 2 mm. broad, thickened in age, deeply 3-lobate, the lobes rounded-ovate, very obtuse; petals 3 mm. long, rounded-ovate, obtuse but apiculate, thickened in age; young fruit scarcely 5 mm. long, green, ovoid or broadly oblong but probably nearly globose in fruit, probably maturing black or glaucous.

The plant may be rare, since we have found it in only the one locality. The very young plants have small, simple, deeply bifid leaves as in *C. elatior*, to which it appears related. The type locality, the wooded rocky banks of Río Carchá, is one of the few places left close to Cobán that retain something of the original, highly varied forest that presumably covered formerly a great part of the Cobán region. Most such forest, if on land that could by any possible means be cultivated, long ago was cleared for agricultural purposes.

**Chamaedorea Casperiana** Klotzsch in Otto & Dietr. Allg. Gartenz. 20: 363. 1852. *Stephanostachys Casperiana* Oerst. Vid. Medd. Kjoebenhavn 1858: 27. 1859; Amér. Centr. 15. *pl.* 7, *f.* 1-11. 1863. *Nunnezhara Casperiana* Kuntze, Rev. Gen. 2: 730. 1891.

Described from cultivated plants, said to have been collected in Guatemala by Warszewicz; represented in Herbarium of Chicago Natural History Museum by three photographs (Negatives 20753, 25385, 29891) of cultivated material distributed by Wendland and agreeing with Klotzsch's descriptions.

Plants solitary with stems to 0.5 meters high (or probably more), thickened to 5.5 cm. in diameter basally, about 2 cm. in diameter above; leaves erect-spreading, about 1 meter long, the sheath about 20 cm. long, clasping the stem and opening obliquely at the apex, the petiole about 27.5 cm. long, pale below as is the rachis, the pinnae 6-7 on each side of the rachis, 5-10-nerved, elongate-lanceolate, falcate, with pendulous long-acuminate tips, the lower pinnae reflexed-spreading, the upper somewhat broader than the remainder, the median (and longest) pinnae 32.5-37.5 cm. long, 5-6 cm. wide at the middle, 1.8 cm. wide at the base; spadices borne below the leaves, subtended by 4 somewhat inflated spathes, sometimes an incomplete fifth spathe borne near the top of the peduncle, the staminate spadices of 7-10 or more pendulous branches to 12 cm. long, densely crowded with white flowers in about 6 rows, the calyx probably membranous, gamopetalous, and conspicuously cupular in bud (from photos), the corolla campanulate with spreading valvate-deltoid lobes; the pistillate spadices erect with about 8 stiff erect branches from a very short axis, the branches to 7.5 cm. long, densely crowded with flowers in about 6 rows, the calyx gamosepalous, membranous and conspicuously cupular in bud (from photos), the petals broadly imbricate; fruit not described.

The species has not appeared in recent collections from Guatemala and its provenance remains uncertain. It is very similar to *C. Arenbergiana*, differing in its smaller leaves and in the more numerous branches of the pistillate spadix.

**Chamaedorea digitata** Standl. & Steyerl. Field Mus. Bot. 23: 200. 1947.

Moist or wet, mixed, mountain forest, 1400-2600 meters; endemic; El Progreso (Sierra de las Minas); Huehuetenango (type



collected in *Liquidambar* forest, Cerro Negro, 2 miles east of Las Palmas, Sierra de los Cuchumatanes, *Steyermark 51683*).

Caudex slender, erect, green, to 1 meter high or more, 5–7 mm. thick, the internodes unequal, short or elongate; leaves rather small, the sheath 16–21 cm. long, tubular, oblique at the apex, 6–13 mm. thick, conspicuously costate-nerved, the sheaths sometimes (the lowest ones) only 8 cm. long, the petioles slender, 14–17 cm. long; leaf blades generally 17–28 cm. long, the pinnae 4–6 on each side, regularly inserted, thin, slightly paler beneath, lanceolate or broadly lanceolate, sigmoid, 6–13 cm. long, 2.5–3 cm. wide, narrowly attenuate-acuminate, narrowed to the base, 4–6-nerved, the primary nerve central, pale below and slightly elevated above, with 3–4 less conspicuous lateral nerves and numerous finer nerves; inflorescences radical in acaulescent plants and apparently breaking through the sheaths at the nodes, the peduncles very slender, about 18 cm. long, 1.5 mm. thick, spathes about 6, closely sheathing, tubular, brownish, striate-nerved, 3–4 mm. in diameter, subacute at the apex; rachis of the staminate spadix only 5–6 mm. long, the 4 branches slender, remotely flowered, 7.5–9 cm. long, the flowers depressed-globose, slightly immersed, the calyx 1.7 mm. broad, very shallowly lobate, the lobes truncate; petals ecostate, rounded-ovate, valvate, obtuse; pistillate spadix with 3–5 slender erect green branches 2–3.5 cm. long, the flowers remote, shallowly immersed, calyx very shallowly 3-lobate, 2.5 mm. broad, petals ovate-rounded, often broader than long, slightly more than 2 mm. long, somewhat 3-nerved outside; immature fruits 5–6 mm. long, subglobose or ovoid-globose, rounded at the base and apex; staminodes present.

Specimens originally assigned to this species are somewhat variable. The type and a staminate plant from El Progreso have inflorescences from the base of a short stem and elongate petioles. Others from Sololá and San Marcos have axillary inflorescences and short petioles only 3–6 cm. long. These appear to be more closely related to *C. Pachecoana*. The description, therefore, is based principally on the type.

***Chamaedorea elatior* Martius, Linnaea 5: 205. 1830.** *Nunnezharaea elatior* Kuntze, Rev. Gen. 2: 730. 1891. *C. scandens* Liebm. in Martius, Hist. Nat. Palm. 3: 308. 1849. *C. resinifera* Wendl. in Otto & Dietr. Allg. Gartenz. 21: 179. 1853. *Nunnezharaea resinifera* Kuntze, Rev. Gen. 2: 731. 1891. *C. desmoncoides* Wendl. in Otto & Dietr. Allg. Gartenz. 21: 177. 1853. *Nunnezharaea desmoncoides* Kuntze, Rev. Gen. 2: 720. 1891. *Chiang* (San Marcos).

Moist or wet, mountain forest, 1100–1500 meters; Alta Verapaz (near Secoyocté, Finca Sepacuite); San Marcos (Volcán de Tajumulco); Huehuetenango (region of Barillas). Eastern and southern Mexico.

Stems sprawling or subscandent, often with arching stems, but when young nearly erect, the caudex 1.5–2 cm. in diameter or less; leaves with elongate tubular

sheaths often covering two nodes and to about 30 cm. long, clothing much of the stem, the blades long-persistent; petioles very short (mostly on adult leaves) to elongate; blades very long, sometimes 3 meters or more in robust adult individuals, entire and deeply bifid when juvenile, progressively more divided up the stem with numerous linear-lanceolate deep green pinnae becoming almost equally attenuate at each end in adult leaves and then strongly indurate-calloused at the very narrow base, and reflexed, median adult pinnae about 35 cm. long or less and to 3 cm. wide, not at all sigmoid, with a prominent central nerve and numerous but inconspicuous secondary and tertiary nerves; inflorescences breaking through the sheaths, subtended by 3-4 spathes, only the upper (and often incomplete) one generally visible, the peduncle usually recurved; staminate spadix 20 cm. long and broad or larger, the branches numerous, slender, naked near the base, rather laxly flowered above, divaricate at a right angle or somewhat reflexed; pistillate spadix large, the branched portion to 40 cm. long and 30 cm. broad, with rather few to very many simple, remotely flowered branches as much as 30 cm. long, these pale orange or salmon-colored or dull brownish in fruit, the flowers not sunken in the axis, the calyx deeply lobed, petals imbricate, rounded and shortly apiculate, staminodes lacking; fruit globose and black with a glaucous bloom at maturity, green when immature, about 10 mm. in diameter.

The Guatemalan specimens referred here correspond well with *Chamaedorea desmoncoides* in their very short petioles and profusely branched inflorescences. *Chamaedorea elatior*, however, is variable, not only in the various stages through which the leaves go as they develop along the stem, but in size of parts, even in the same region. Thus, elongate or very short petioles may be found on the same plant, depending on the position of the leaf. The number of pinnae and of branches of the pistillate spadix appears to vary sufficiently to make the separation of forms cited in synonymy not only difficult but illogical.

This species is distinct in habit. The rather stout stems arch and either sprawl over the ground or are supported on other vegetation. The epithet *desmoncoides* would be most appropriate were it the oldest available since plants are readily mistaken for *Desmoncus* when not examined closely.

**Chamaedorea elegans** Martius, Linnaea 5: 204. 1830. *Collinia elegans* Liebm. ex Oersted, Vid. Medd. Kjoebenhavn 1858: 6. 1859. *Nunnezhara elegans* Kuntze, Rev. Gen. 2: 730. 1891. *Neanthe bella* O. F. Cook, Science 86: 120. 1937, nomen without Latin description; Nat. Hort. Mag. 17: 1-12, f. 1-8. 1938, without Latin description. *Pacaya*; *Pacayito*; *Kiik* (Quecchí). Figure 41.

Moist or wet, usually dense, mixed, mountain forest, 1400 meters or lower; Petén; Alta Verapaz. Eastern and southern Mexico.

Plants very slender, in age as much as 2 meters high or even taller, but often flowering when very small and not more than 30 cm. high, then essentially acaul-lescent, the caudex erect or decumbent, 8–16 mm. in diameter, green, densely annulate with short internodes; leaves few and small, the sheath long, slender, open nearly to the base, the petiole slender, 12–27 cm. long, the rachis very slender and pale-backed; pinnae 11–20 on each side of the rachis, linear to narrowly lanceolate, long-attenuate, 12–20 cm. long, 1–2 cm. wide, the primary nerve central, pale, prominent, slightly elevated above but not keeled, secondary nerves generally less prominent, 2 on each side, evenly spaced, tertiary nerves numerous and fine; inflorescences erect from the sheaths, the peduncle 10–13 cm. long or more, subtended by 4–7 (♂) or 6–9 (♀) tubular sheaths split at the apex, the spadices with few or numerous, simple or branched green rachillae with sharp ridges, the pistillate rachillae becoming orange in fruit; flowers sessile, remotely spiralled, the staminate 2 mm. high, pale yellow, prominently nerved when dry, the calyx 0.75 mm. high, shallowly 3-lobed; petals connate nearly to their tips, the apex of the corolla with a 3-angled opening; stamens with short filaments and entire anthers, these scarcely visible beneath the flaring 6-angled apex of the pistillode; pistillate flowers 2.5 mm. high, nerved when dry, the calyx 1 mm. high, rather deeply 3-lobed, petals connate except for a 3-angled aperture at the tip, staminodes lacking, ovary depressed-globose with sessile stigmas; fruit globose, black at maturity, about 6 mm. in diameter.

*Chamaedorea elegans* has been separated as the single species in *Collinia* by Burret. Despite the unusual union of perianth parts, the species is obviously closely related to others, such as *C. Liebmannii* and *C. humilis* of Mexico, in which the corolla is lightly imbricate in the pistillate flowers; fruiting specimens are distinguished by the valvate lobes of the corolla, which splits evenly into three parts.

The Guatemalan specimens referred here have been considered distinct by O. F. Cook, who used the invalid name *Neanthe bella* for them. When plants from the entire range of the species are considered, it is difficult to find differences that are of specific significance. In general, however, plants from Guatemala are more delicate than those from the northern part of the range and they rarely have other than simple branches in the inflorescence of both sexes.

**Chamaedorea Ernesti-Augustii** Wendl. in Otto & Dietr. Allg. Gartenz. 20: 73. 1852; Index Palm. 12: 58. 1854; Hook. f. in Bot. Mag. pl. 4831, 4837. 1855; Flore des Serres ser. 2, 3: 133. pl. 1357. 1858. *Eleutheropetalum Ernesti-Augustii* Oerst. Vid. Medd. Kjoebenhavn 1858: 7. 1859. *Nunnezharaea Ernesti-Augustii* Kuntze, Rev. Gen. 2: 730. 1891. Figure 41.

Dense, wet forests, often on limestone, mostly at low elevations but to 1100 meters in Alta Verapaz; Alta Verapaz; Huehuetenango; Izabal; Petén. Southern Mexico to Honduras, described from cultivated plants supposedly from Tabasco, Mexico, and represented in



the Herbarium of Chicago Natural History Museum by type photographs (Negatives 20806, 20806a, 25388).

Plants to 2 meters high or more, the slender stems to 13 mm. in diameter, sometimes flowering while nearly stemless; leaves spreading, simple, broadly cuneate-obovate in outline, deeply cleft at the apex, dull dark green above, dull green below, the sheath obliquely open above the middle, 8–10 cm. long, the petiole 8–20 cm. long, pale-centered below as is the rachis, this 17–28 cm. long, the blade 22–25 cm. long on the upper margin, 20–25 cm. wide at the tip of the rachis, the subscarios margins shortly emarginate at the tips of the 13–16 nerves on each side, toothed between the nerves, the latter pale, dull, and scarcely prominent below, prominently keeled above; inflorescences solitary from orifices of the sheaths, but sometimes persisting below the leaves in fruit, subtended by 4 (♂)–5 (♀) closely sheathing tubular spathes, the uppermost of which is slightly shorter than to exceeding the erect peduncle, the staminate spadices with an elongate peduncle to 30 cm. long or more, copiously branched with slender, green, divaricate to pendulous, simple branches to 13 cm. long from a rachis to 15 cm. long, the flowers 2.5 mm. high, seated in shallow depressions in a loose spiral, the pale yellow, membranous, nerveless calyx about 1 mm. high, rather deeply 3-lobed and brown-margined, the bright orange corolla with petals connate in a shortly stipitate base, free, fleshy, nerveless and valvate above, the stamens with filaments shorter than the anthers, these deeply bifid at base and apex, pistillode columnar, expanded into a truncate 6-angled cap; the erect pistillate spadices with peduncles to 70 cm. long, the rachis to 27 cm. long, simple, thick, dull green at anthesis, becoming orange or vermilion and thicker in fruit, the flowers about 3.5 mm. high, separated in prominent elliptic depressions in a loose spiral, the yellowish calyx of 3 lightly imbricate nerveless sepals 1.5 mm. high, the bright orange petals thin, slightly nerved and very narrowly imbricate at the base in bud though at anthesis appearing valvate throughout, above becoming fleshy, nerveless, and cucullate, the cucullate portion usually deciduous as fruit develops, staminodes present, prominent, pistil of 3 nearly free carpels lightly connate centrally near the base at anthesis, stigmas sessile and recurved, the abortive carpels adherent to the perianth in fruit; fruit subglobose to generally ellipsoid, green to blue-green becoming black at maturity, to 14 mm. long, 8 mm. in diameter with remains of a single stigma at the base and pale depressions where abortive carpels have torn away, the seed to 11 mm. long, 7 mm. in diameter.

*Chamaedorea Ernesti-Augustii* is frequently confused with *C. genomaeformis*, from which it differs in obvious floral characters and in the keeled nerves of the broader leaves. A closely related but stouter species, *C. Sartori*, differs principally in its leaves with several sigmoid pinnae on each side and 4–6 branches of the pistillate spadix. The last ranges from eastern Mexico to Honduras and may be expected in Guatemala, though it has not been recorded.

***Chamaedorea erumpens*** H. E. Moore, *Gentes Herb.* 8: 232. 1951.

Dense, wet, lowland forests at altitudes of 500 meters or less; described from plants supposedly from British Honduras; Petén (Tikal district).

Plants caespitose in clumps of as many as 40 slender green stems to 3 meters high or more, 11–17 mm. in diameter, the internodes elongate; leaves about 4, pinnate, the cylindric sheaths 16.5–20 cm. long, striate-nerved, the petiole 4.5–8 cm. long, the rachis green below, 18–47.5 cm. long with 5–15 deep green pinnae on each side, the terminal pair sometimes scarcely larger than those below, sometimes broader and then to 9 cm. wide and 7–9-nerved and lower pinnae 4–5 on each side of a foreshortened rachis; pinnae lanceolate, tapered subfalcately below to a short-acuminate or acute pendulous tip, the median largest, to 27.5 cm. long, 1.6–3 cm. wide, all but the terminal pair with a central primary nerve prominent below but scarcely elevated above and a pair of lateral and submarginal nerves on each side, the remainder of two orders, numerous and inconspicuous; inflorescences solitary, erumpent through the sheaths at the nodes or persisting below the leaves, the peduncles short, 4–7 cm. long, subtended by 5 short, closely sheathing spathes, the uppermost sometimes exceeding the peduncle and split along the lower side, the green staminate spadix with 6–11 erect or spreading, simple or rarely furcate branches 7.6–15 cm. long from a rachis 2–4.5 cm. long, the flowers yellow, somewhat sunken in a loose spiral, the nerveless sepals very shortly connate at the base, imbricate above, 1 mm. high, the petals nerveless, valvate above a shortly connate base, fleshy, not connate at the tip, the stamens with short filaments and anthers bifid at the tip, pistillode columnar, 3-lobed at the apex; pistillate spadix with 4–6 simple erect deep green branches 9–10.5 cm. long from a rachis 1–2.5 cm. long, becoming thickened and orange in fruit, the yellow flowers somewhat sunken in a loose spiral, sepals green drying yellow, imbricate, 1–2 mm. high, petals imbricate, nerveless, acutish, 3 mm. high, drying brown and slightly nerved, staminodes present, pistil subglobose with sessile stigmas; fruit black at maturity, globose, about 8 mm. in diameter.

***Chamaedorea falcifera*** H. E. Moore, *Principes* 2: 68, *fig. 45*. 1958.

Dense, wet, mixed, lowland forest, 40–300 meters; endemic; Ixabal (type from Cerro San Gil, along Río Frío and tributaries, *Steyermark* 41640; also between Bananera and “La Presa” in Montaña del Mico).

Stems solitary, slender, 1–6 meters high, 5–7 mm. in diameter, the internodes 1.5–3.2 cm. long; leaves 3–5, pinnate, the sheath 6–9 cm. long or rarely more, cylindric, briefly oblique at the apex, striate-nerved, the petiole 6.5–12 (rarely to 33) cm. long, pale below as is the rachis, this 10.5–23 cm. long; pinnae firmly membranaceous, rich shining green above, paler and dull green below, 3–4 on each side, the terminal pair broadly sigmoid, acute to subacuminate, 14–16 (–21) cm. long on the upper margin, 5.5–9 cm. on the rachis, one side usually lower than the other, with 4–7 primary nerves keeled above, pale and shining below when dry, secondary nerves 2–4 between the primaries, inconspicuous; lower pinnae progressively smaller, sigmoid-acuminate, alternate, 11–14 (–21) cm. long, 2.5–3 (–4.5) cm. wide

or the lowest only 7.5–9 (–18) cm. long, 1–1.5 (–3) cm. wide, each with a prominent central nerve and submarginal nerves and 1–3 pairs of inconspicuous secondary ones on each side, at least the central nerve somewhat keeled; inflorescences borne below the leaves, arcuate-nodding, subtended by 3 (♂) –4 (♀) tubular brown spathes, the lowermost inserted about 1 cm. above the base, the uppermost slightly exceeding the peduncle in staminate plants, the peduncles 16–21 cm. long, staminate ones with 5–7 divaricate-pendulous slender green branches (6–) 9–14.5 cm. long from a rachis 1–2 cm. long, the strongly ribbed (when dry) flowers 2 mm. long, yellowish-green, essentially superficial, rather densely spiralled, the calyx 0.75 mm. high, longer than broad, imbricately deeply 3-lobed, the petals shortly united and laterally compressed in a linear base, expanded above and connate by their tips, the corolla opening by lateral slits, stamens subsessile with anthers entire at the apex, sagittate at the base, pistillode 3-angled, truncate; pistillate inflorescence with 4–8 slender branches 5.5–13 cm. long from a rachis 1.5–2 cm. long, becoming orange in fruit; fruit orange, rather densely spiralled, essentially superficial on the branches, sickle-shaped, 1.1–1.4 cm. long, 3–4 mm. in diameter, the perianth nerved when dry, calyx 0.7 mm. high, shallowly 3-lobed, petals imbricate, the 2 larger 2 mm. high, staminodes lacking, abortive carpels adherent to the fruit at maturity; seed 9 mm. long, 2 mm. in diameter, the embryo at the middle.

The fruits of this species are suggestive of the more robust *C. neurochlamys* but are distinct in their shape. Staminate and pistillate inflorescences of this apparently local species are few-branched, differing in this respect from other species allied to it. The foliage is distinguished with difficulty from that of *C. micrantha* and *C. Aguilariana*.

***Chamaedorea geonomaeformis*** Wendl. in Otto & Dietr. Allg. Gartenz. 20: 1. 1852; Oerst. Amér. Centr. *pl.* 5, f. 1–17. 1863. *Nunnezharoa geonomaeformis* Hook. f. Bot. Mag. *pl.* 6088. 1874. *Capucapocha*. Figure 41.

Dense, moist or wet, mixed forest, generally at altitudes of 100 meters or less or rarely to nearly 600 meters; Izabal; eastern Verapaz and Chiquimula; described from plants said to have been grown from Guatemalan seed collected by Warscewicz (type material illustrated by photograph in Herbarium of Chicago Natural History Museum; Negative 29895). British Honduras; Honduras.

Stems solitary, to 1.7 meters high, 4–7 mm. in diameter, but sometimes flowering while still nearly stemless; leaves erect-spreading, rich grass green above, grass green below, simple, oblanceolate in outline, deeply furcate at the apex in a very slender acute angle, the sheath obliquely open above the middle, 5–7 cm. long, the petiole 5–15 cm. long, pale-centered below as is the rachis, this 11–22 cm. long; leaf blade 6.5–13 cm. long on the upper margin, 6.7–12.5 cm. wide at the tip of the rachis, the subscarious margins briefly emarginate or mucronulate at the tips of 9–12 nerves on each side, toothed between the nerves, the latter pale and prominent below, not keeled above; spadices solitary from the orifices of the sheaths but sometimes persisting below the leaves in fruit, subtended by about 5 closely sheath-



ing tubular spathes, the uppermost somewhat shorter than to exceeding the erect peduncle, the staminate spadices with 1-4 (-6) pendulous green branches, the lemon-yellow flowers 2.5 mm. high, sessile in shallow elliptic depressions and rather crowded on branches to 18 cm. long but not in distinct groups or rows, the annular calyx 0.5 mm. high, broadly 3-lobed, not nerved when dry, the corolla scarcely nerved, petals very shortly connate basally, connate at their tips, the corolla opening by lateral slits, stamens with filaments about equaling the anthers, these entire at the apex, briefly separated at the base, the pistillode columnar, truncate; pistillate spadices simple or with 2-3 rachillae 5-13.5 cm. long, erect, becoming somewhat thickened and orange to vermilion in fruit, the flowers 1-1.2 mm. high, separated and sessile in shallow subglobose depressions in a spiral, the calyx of imbricate, strongly nerved (when dry) sepals, 0.5 mm. high or less, the corolla of imbricate nerved (when dry) petals, staminodes lacking, abortive carpels adherent to the fruit; fruit blue-black at maturity, globose or nearly so, 7-9 mm. in diameter (or to 12 mm. when fresh), falling with perianth attached, the seed to 9 mm. in diameter.

This palm, like some other species, flowers at an early stage of development, the first inflorescence sometimes appearing in the axils of the third leaf as in *C. Ernesti-Augustii*, with which it is often confused. The species is the type of the genus *Migandra* O. F. Cook (Nat. Hort. Mag. 22: 142. 1943), which was described without Latin diagnosis and therefore has no standing. The transfer of *Chamaedorea geonomaeformis* was suggested but not actually made.

**Chamaedorea Lehmannii** Burret, Notizbl. Bot. Gart. Berlin 11: 857. 1933. *Chiquilote* (El Progreso); *Guite* (Zacapa).

Dense, moist or wet, mountain forest, 1400-2600 meters; endemic; Alta Verapaz (type collected in forest near Cobán, *F. C. Lehmann 1374*); El Progreso (Sierra de las Minas); Zacapa (Sierra de las Minas).

Plants small and slender, 2 meters high or less, often flowering when acaulescent or nearly so, the caudex 1 cm. thick or more, densely annulate; sheaths about 12 cm. long, obliquely open for about half their length, densely imbricate below, strongly striate-nerved, attenuate into the base of the petiole, this rather stout, 15-20 cm. long; leaf blades 50 cm. long or larger, the rachis verrucose on the angles and ridges above, the segments regularly disposed, about 8 on each side, narrowly lanceolate, very inconspicuously if at all sigmoid, almost equally attenuate to each end, the apical ones somewhat broader than the others, the segments with a prominent keeled central nerve and 2-4 less prominent slender secondary ones, 20 cm. long and 2 cm. wide or smaller, the terminal pair sometimes as much as 3.5 cm. wide; inflorescences solitary, erect, rising from the orifices of the sheaths, subtended by 5 (♂) -6 (♀) tubular slender spathes, the staminate spadix long-pedunculate, with about 6 erect branches 18 cm. long or less, the green flowers 3 mm. high, essentially superficial, well separated in a loose spiral, the calyx nerveless, rather deeply 3-lobed, the petals nerveless, not united at the apex, the anthers not divided apically and about as long as the filaments, pistillode columnar; pistillate spadix

on a long slender peduncle, the branches 1-3 and 8-11 cm. long, rather stout, orange-red in fruit, the flowers rather remote, subglobose, dull green, the calyx short-cupular, with broadly rounded lobes, the petals elliptic, obtuse; staminodes present, abortive carpels adherent to the corolla in fruit; fruit globose, black, 7 mm. long when dry, the seed globose, of about the same diameter.

This species, as interpreted from plants of the Sierra de las Minas, superficially resembles completely pinnate forms of *C. adscendens*, especially in the foliage. It is, however, amply distinct in distribution at much higher elevations, in its erect spadices emerging from the orifices of the sheaths, in its fewer spathes, and loosely flowered staminate spadix with erect branches.

**Chamaedorea micrantha** Burret, Notizbl. Bot. Gart. Berlin 11: 749. 1933.

Dense, wet, mixed, mountain forest, 1200-1600 meters; endemic; Alta Verapaz (type collected at unknown locality by Tuerckheim) along Río Frío below Tactic and along Río Carchá between Cobán and San Pedro Carchá.

Plants solitary, erect, the slender caudex about 1 meter high, 7-10 mm. in diameter with internodes 1.7-3 cm. long; leaves pinnate, the sheath 10-16 cm. long, shortly oblique at the apex, striate-nerved, petiole elongate, 12.5-23 cm. long, pale-backed as is the rachis, this 28-38 cm. long with usually 5 pinnae on each side; pinnae strongly sigmoid, acuminate, alternate, the largest near the base and there 15-28 cm. long, 3.5-6.5 cm. wide, the median and submarginal nerves rather prominent but scarcely keeled above, pale below, the 2-3 secondary nerves on each side only moderately conspicuous, the apical pair of pinnae much broader than the others (rarely one side divided) with generally 4-5 primary nerves, the secondary nerves between them only moderately conspicuous; inflorescences slender, arising among or below the leaves, erect but nodding at the tip, the peduncles 24-30 cm. long, subtended by 4-5 closely sheathing tubular spathes, the lowest inserted above the flattened base of the peduncle, the uppermost often exceeding the peduncle; staminate spadices with 12-17 slender spreading-pendulous branches generally 10-15 cm. long, but sometimes shorter and sometimes the lower forked, the axis 3.5-6.5 cm. long, the strongly nerved flowers 3 mm. high, essentially superficial, rather densely spiralled, the calyx 1 mm. high, shallowly 3-lobed, longer than broad, the petals compressed in a linear base, expanded above and connate at their tips, the corolla opening by lateral slits, the stamens with short filaments, the anthers bifid at the base, entire at the apex, pistillode 3-angled, subtruncate; pistillate spadix with 7-17 spreading or nearly pendulous branches 6-9 cm. long from an axis 2.5-5 cm. long, the strongly nerved flowers 2 mm. high, essentially superficial, rather loosely spiralled, the calyx 1 mm. high, rather deeply and imbricately 3-lobed, the petals imbricate, staminodes lacking, pistil ovoid with sessile stigmas; fruit not known.

The shape of the fruit is an important specific criterion in the group of species to which material assigned to *C. micrantha* belongs.

It is unfortunate that all the specimens studied and agreeing with Burret's description are in flower. As it is here interpreted, *C. micrantha* seems very close to *C. Aguilariana* and, in turn, to *C. concolor* from Mexico. Dried foliage has a distinctive appearance—pale with rather inconspicuous secondary nerves—that suggests caution in attempting to unite the species with another. On the other hand, it is not possible to distinguish the species by adequate means and further collecting is required to ascertain its status. The leaves, as noted by Burret, are more graceful and delicate than those of *C. concolor* and in this respect resemble those of *C. falcifera*.

**Chamaedorea neurochlamys** Burret, Notizbl. Bot. Gart. Berlin 11: 744. 1933. *Docanthe alba* O. F. Cook, Nat. Hort. Mag. 22: 96. f. 9-11. 1943 (published without Latin description). *Pacaya*; *Pacayo*; *Chilac* (Huehuetenango).

Dense, moist or wet, mixed forest, 700 or mostly 200 meters or lower; Alta Verapaz; Huehuetenango; Izabal; Petén. Southern Mexico to Honduras in Atlantic lowlands.

Plants solitary, 1.5-4.5 meters high, caudex 1.2-2.5 cm. in diameter; leaves few, pinnate, dull dark green above, dull green below, sheaths about 18 cm. long, cylindric, obliquely open at the top and there pale-margined (when fresh), striate-nerved, the petiole 15-29 cm. long, pale below as is the rachis, this 45-65 cm. long with 6-8 pinnae on each side; pinnae regularly spaced and remote except sometimes the lower 2-3, narrowly rhombic-sigmoid, acuminate at the apex, narrowed to the base, the lower central pinnae longest, 23-33 cm. long, 5-6.5 cm. wide, with prominent central and submarginal nerves shining and slightly keeled, at least toward the base, above and pale and shining below, 4-5 slightly less prominent secondary nerves on each side, tertiary nerves fine and numerous, the uppermost pinnae somewhat broader, 14-16 cm. long on the upper margin, about 5-nerved, the lower pinnae smaller; inflorescences arising among or below the leaves, 30-42 cm. long, subtended by 5-6 slender tubular appressed spathes, the staminate spadix with 15-20 or more slender pendulous light green branches 15-20 cm. long from an axis 4-7 cm. long, the flowers 2 mm. high, yellow, strongly nerved when dry, scarcely immersed in the axis, rather densely spiralled, the calyx about 0.5 mm. high, shallowly 3-lobed, longer than broad, the petals very shortly connate and laterally compressed in a linear base, arcuate above to a depressed apex and there connate, the corolla opening by lateral slits, the stamens with short filaments, anthers not bifid at the apex, pistillode 3-angled, truncate; pistillate spadix erect at anthesis, nodding in fruit, simply branched with 10-25 slender ascending branches 9-14 cm. long from an axis 6-10.5 cm. long, becoming orange or vermilion in fruit, the flowers 1.5-2 mm. high, strongly nerved when dry, scarcely immersed in the axis, loosely spiralled, the calyx 0.75-1 mm. high, deeply 3-lobed, the lobes rounded, the petals imbricate, staminodes lacking, the pistil ovoid with sessile recurved stigmas, the abortive carpels adhering to the fruit at maturity; fruit subreniform, obtuse, orange (perhaps blackening when dead ripe), about 10 mm. long, 5 mm. in diameter.



*Chamaedorea neurochlamys*, known in British Honduras as "monkey-tail," was described from flowering material collected in the vicinity of Cubilgüitz, Alta Verapaz. A superficial resemblance to *Chamaedorea oblongata* should not be confusing if the nervation of pinnae and especially the staminate flowers are observed.

**Chamaedorea nubium** Standl. & Steyerl. Field Mus. Bot. 23: 202. 1947.

Moist or wet, mixed, mountain forest, 1500–2900 meters; El Progreso (type from Sierra de las Minas, hills north of Finca Piamonte, toward the summit of Volcán de Santa Luisa, in cloud forest, *Steyermark 43583a*); Huehuetenango (Sierra de los Cuchumatanes, Cerro Huitz). Southern Mexico (Chiapas).

Caudex slender, erect, 1.5–2.5 meters high, 8–10 mm. in diameter, the uppermost internodes short, the lower ones as much as 9.5 cm. long; leaves simple, the sheath 30 cm. long, tubular, oblique at the apex, laxly appressed, about 13 mm. in diameter, striate-nerved, the petiole slender, 9–19 cm. long; leaf blades variable, sometimes about 45 cm. long and deeply bifid, the rachis 9.5–15 cm. long, the segments 20–33 cm. long on the upper margin, falcately long-acuminate, entire or subentire, cuneate-acute at the base, the primary nerves 14–17 on each side, prominent, keeled above, the secondary ones obscure, or sometimes the blades partially to completely pinnate, then with rachis about 33 cm. long, about 13 pinnae on each side, the terminal scarcely broader than the others, or the rachis to about 25 cm. long, the terminal pair of pinnae broad and about 7-nerved, the lower pairs about 6, the pinnae, when developed separately, narrowly falcate, to 21 cm. long, 2 cm. wide, the central and a pair of lateral nerves prominent and keeled; peduncles recurved, 25–27 cm. long, 2.5 mm. thick near the apex, the spathes (perfect ones not seen) narrowly tubular, striate-nerved, 3–4 mm. thick, acute at the apex, appressed; the staminate spadix with about 15 markedly undulate rachillae to 6.5 cm. long, the laterally compressed flowers subimmersed and rather distant in narrowly elliptic alveolae in the curves, distributed in a loose spiral but appearing as though in opposite lines, the calyx very low, scarcely 0.5 mm. high in bud, membranous, nerveless, shallowly lobed, the petals nerveless in bud, longer than high, the stamens with very short filaments and anthers briefly bifid at the apex, more deeply so at the base, pistillode short-columnar, truncate; pistillate spadices in fruit about 15 cm. long, the rachis 4 cm. long or sometimes more, the branches 5 or more, strongly undulate and orange, the flowers subimmersed and rather distant in a loose spiral but appearing almost distichous, the alveolae 2.5 mm. long, calyx very short, shallowly 3-lobate, the broad lobes subtruncate, nerveless, the petals thickened in age, semi-orbicular, nerveless, drying dark brown, staminodes present; fruit at maturity black with a glaucous bloom, ovoid-globose, to about 14 mm. long and 11 mm. broad.

**Chamaedorea oblongata** Martius, Hist. Nat. Palm. 3: 160. 1837. *Nunnezhara oblongata* Kuntze, Rev. Gen. 2: 729. 1891. *Chamaedorea lunata* Liebm. in Martius, Hist. Nat. Palm. 3: 307.

1849. *Nunnezharoa lunata* Kuntze, Rev. Gen. 2: 729. 1891. *Chamaedorea fusca* Standl. & Steyerl. Field Mus. Bot. 23: 200. 1947. *Cauquib* (Alta Verapaz). Figure 41.

Moist or wet, mixed, lowland forest, sometimes at least on limestone, generally 350 meters or lower; Alta Verapaz; Izabal; Petén. Eastern Mexico to Nicaragua.

Plants solitary, erect, 1.5–3 meters high, the caudex 1–2.5 cm. thick, the internodes unequal, 4–15 cm. long; leaves pinnate, the sheath to 20 cm. long, cylindric, oblique at the apex, prominently costate, the petiole 25–31 cm. long, stout, pale-backed as is the rachis, this 35–55 cm. long with 6–9 mostly alternate, somewhat coriaceous pinnae regularly disposed on each side; pinnae rhombic-lanceolate or lanceolate and strongly sigmoid, deep green and glossy above, paler below, the middle ones 17–40 cm. long, 3.5–10 cm. wide, narrowly and caudately long-acuminate or attenuate-acuminate, the primary nerves 3, central and submarginal, these not keeled above, yellowish and shining below, the secondary nerves about 3 on each side, inconspicuous as are the numerous very fine tertiary nerves, terminal pinnae shorter than the succeeding ones and generally narrower; inflorescences arising below the leaves, spreading, slender, the peduncles 15–30 cm. long subtended by 5–7 tubular sheathing striate-nerved spathes; staminate spadix with 9–25 or more pendulous slender slightly angled branches to 30 cm. long from an axis 9–12 cm. long, the superficial or slightly impressed nerveless flowers rather densely spiralled, drying black, the calyx shallowly 3-lobed, about 0.5 mm. high, the valvate petals 3–4 mm. high, not connate at the tip but united basally in a short stipe, stamens with anthers longer than the filaments and briefly bifid at the apex, pistillode cylindric, slightly expanded and truncate at the apex; pistillate spadix with 6–20 or perhaps more stiff branches 9–16 cm. long becoming orange in fruit, the nerveless flowers drying black, scarcely immersed in a loose spiral, calyx deeply 3-lobed, about 1 mm. high, petals imbricate above a very shortly connate base, 2 mm. high, broadly ovate, acute, drying dark brown in fruit with abortive carpels adherent to the smallest petal, staminodes present, pistil with sessile stigmas; fruit shining black at maturity, 10–14 mm. long, 7–8 mm. in diameter, ellipsoid or very slightly lunate.

***Chamaedorea Pachecoana*** Standl. & Steyerl. Field Mus. Bot. 23: 202. 1947. *Pacaya*. Figure 41.

Dense, moist or wet, mixed, mountain forest, 1200–1500 meters, or perhaps even higher; endemic (type cultivated in the garden of Don Mariano Pacheco Herrarte, Guatemala, said to have come from Totonicapán, but perhaps in error, *Standley 63104*); Quezaltenango (known only from the barranca of the Río Samalá, along the lower slopes of the volcanoes of Santa María and Zunil).

Plants very small, 60 cm. high or less, the stems very slender and densely annulate, decumbent and rooting with only the top exposed for about 8 cm., the internodes scarcely 6 mm. long; leaves often numerous, small, pinnatisect, mostly 30–60 cm. long and 8–13 cm. wide, the sheath about 5 cm. long, open to the base, lax, striate-nerved, the very slender petioles 7–17 cm. long, somewhat verrucose above,

the rachis pale-backed, verrucose on the angles and ridges above; pinnae thin, mostly 7–11 on each side, broadly rhombic-lanceolate or oblong-lanceolate, sigmoid, 4.5–8 cm. long and 1.5–2 cm. wide or sometimes slightly larger, narrowly and falcately long-acuminate, arcuate-cuneate at the base and sometimes very minutely auricled with a very narrow basal attachment, the margins shallowly toothed toward the tip and often verrucose toward the base, regularly inserted, alternate or subopposite, the terminal ones coalescent, sometimes slightly longer and broader than the succeeding ones, all the segments 3-nerved, the secondary nerves slender and inconspicuous; spadices solitary, erect from the orifices of the sheaths or sometimes borne below the leaves, subtended by 5–6 very narrowly tubular spathes scarcely 2 mm. in diameter, the upper ones 5–7.5 cm. long, oblique at the apex; peduncles very slender, mostly 11–23 cm. long, scarcely more than 1 mm. thick near the apex; staminate spadix 7–11 cm. long, the rachis very short, the branches 1–5, rather densely flowered to the base, the greenish-yellow, subimmersed flowers very numerous, 3 mm. high, the nerveless calyx 2.5 mm. broad, shallowly 3-lobate; petals incurved but not connate at the apex, broadly ovate, obtuse, not nerved; anthers oblong-ovate, obtuse, pistillode columnar; pistillate spadix simple or furcate and 5–10 cm. long, the branches sparsely flowered, rather stout, straight, the flowers spirally disposed, subimmersed, the rachis red or orange in fruit; calyx 2 mm. broad, shallowly 3-lobate, the nerveless lobes broadly rounded, petals pale, rounded-ovate, 2 mm. long, acute, slightly striate-nerved when dry, staminodes present, abortive carpels generally adherent to the corolla in fruit; fruit black at maturity, globose or ovoid-globose, 6–8 mm. in diameter.

This is easily the smallest of all the known palms of Guatemala and one of the most attractive. Although *C. elegans* blooms when even smaller, it soon attains a much greater size, becoming 2 meters high or more. All the plants of *C. Pachecoana* that we have seen, and they are numerous in the forested parts of the barranca of the Samalá, had only very short emergent caudices, the remainder being below ground and often rooting at the nodes. For pot culture, *C. elegans* is probably more desirable, since it is more slender and graceful, but *C. Pachecoana*, on the other hand, has usually more numerous and somewhat crowded leaves. It is rather remarkable that so unusual a palm should have remained unknown to foreign cultivation, especially since it grows almost beside one of the oldest roads of western Guatemala, along which various botanists have traveled during the past century.

**Chamaedorea parvisecta** Burret, Notizbl. Bot. Gart. Berlin 11: 742. 1933.

Moist or wet, mixed, mountain forest, 1600 meters; Alta Verapaz (type from mountains near Cobán, *Tuerckheim II.* 2185).

Plants very slender, the caudex arundinaceous, 5–7 mm. in diameter, with internodes about 3 cm. long; sheaths elongate, slender, cylindric, oblique at the apex; petiole slender, about 30 cm. long; leaf blades about 40 cm. long with 10 or



more pinnae on each side of a pale-backed rachis; pinnae small, regularly disposed, alternate, lanceolate, not conspicuously sigmoid, long and narrowly acuminate, the larger central ones about 15 cm. long, 2 cm. wide (or more?); inflorescences breaking through the sheaths at the nodes(?), the peduncle about 16 cm. long, subtended by about 8 spathes, the lowest four of these short and densely congested, staminate spadix very slender with about 8 slender branches, the small nerveless flowers semi-globose in bud, the calyx low, with 3 broadly rounded, nearly free lobes, petals ovate, pistillode columnar; pistillate spadix with about 4 branches 5–5.5 cm. long; fruits laxly disposed, seated in distinct depressions in the axis, broadly ovoid, about 8 mm. long, 7 mm. in diameter; seed with embryo below the middle.

One specimen, *Standley 91426*, from mountains along the road between Tactic and the divide on the road to Tamahú at an elevation of 1500–1600 meters, appears to belong here but the pinnae are broader (to 3.5 cm.) than those described by Burret. The latter has suggested that *C. parvisecta* may be no more than a genotypic variant of *C. pulchra*, a possibility borne out by the single collection but requiring further study.

***Chamaedorea pulchra*** Burret, Notizbl. Bot. Gart. Berlin 11: 741. 1933.

Moist or wet, mixed, mountain forest, 1550 meters; Alta Verapaz (type collected in Guatemala without special locality, but doubtless from the Cobán region; paratype from Cobán).

Caudex slender, about 1 cm. in diameter, the internodes separated; sheath elongate, cylindric, thin, becoming dry and persistent, oblique at the apex; petiole about 20 cm. long; leaf blade about 45 cm. long, nearly concolorous, papery membranaceous with 8 or perhaps more pinnae on each side of a pale-backed rachis; pinnae lanceolate, slightly sigmoid, regularly disposed with the apical pair broader than the others, the larger central pinnae 16–20 cm. long, 2.7–3.5 cm. wide, the basal pinnae smaller and closer together, all narrowly acuminate with a conspicuous midnerve and 2 prominent secondary nerves on each side, tertiary nerves slender, numerous, inconspicuous; inflorescences emerging through the sheaths at the nodes, the slender peduncles 21–30 cm. long, subtended by about 6 closely sheathing spathes; the staminate spadix with about 10 slender branches 10 cm. long, the flowers semi-globose in bud and densely spiralled, the nerveless calyx low with 3 broadly rounded lobes, petals nerveless, free, ovate, anthers oblong, pistillode columnar; pistillate spadix with about 10 rather stout branches, these subangular and ridged when dry, about 6 cm. long, the nerveless flowers slightly immersed and moderately densely spiralled, the calyx low, shortly cupular at the base with 3 broadly rounded nearly free lobes, the ovate petals free, imbricate, staminodes present, stigmas sessile.

No material definitely referable to this species has been studied, and the description is taken from Burret. One specimen, tentatively referred to *C. parvisecta*, has the inflorescences breaking through the sheaths and the broad pinnae of *C. pulchra*. It is likely that further

collecting will show that these do not represent distinct species, a possibility suggested by Burret himself.

***Chamaedorea quetzalteca*** Standl. & Steyerl. Field Mus. Bot. 23: 204. 1947.

Known only from the type, Quezaltenango, dense damp mixed mountain forest, along the old road between Finca Pirineos and Patzulín, on the lower slopes of Volcán de Santa María, 1200–1400 meters, *Standley 87159*.

Plants slender, about 1.5 meters high, the caudex almost 1 cm. in diameter, lustrous, the internodes 1.5–3 cm. long; leaf sheaths about 17 cm. long, tubular, almost 1.5 cm. thick, finely striate-nerved, the petiole slender, elongate, 2.5 mm. thick, the blades pinnate; pinnae about 16 on each side of a pale-backed rachis 40 cm. long or more, regularly disposed, alternate, thin, deep green on both surfaces, linear-lanceolate, scarcely sigmoid but falcately narrowed to a long-acuminate tip, the larger middle ones 19 cm. long and 2 cm. wide, gradually narrowed to the base, mostly 5-nerved with nerves pale and slightly keeled above, shining and pale below when dry, the secondary nerves very slender and obscure, or else 3-nerved with but a single secondary nerve between each pair of primary ones, the uppermost pinnae only 9 cm. long and scarcely 1 cm. wide; peduncles very slender, as much as 25 cm. long, 1.5 mm. thick near the apex, the spathes (perfect ones not seen) tubular, 3 mm. thick, oblique at the apex; pistillate spadix furcate with branches about 8 cm. long, spirally and laxly few-flowered, the rachis very slender, somewhat flexuous, the flowers distant, not immersed, the alveolae broadly oval, 1.5 mm. long; calyx explanate beneath the fruit, 2.5 mm. broad, shallowly 3-lobed, the lobes broadly rounded or subtruncate; petals thickened in age, drying pale with a dark margin, ovate-rounded or very broadly ovate, sometimes broader than long, about 3 mm. long, sometimes 4 mm. wide, not nerved; immature fruit subglobose, symmetric, 6 mm. in diameter, broadly rounded at base and apex.

***Chamaedorea Rojasiana*** Standl. & Steyerl. Field Mus. Bot. 23: 205. 1947. *Pacaya; Molinillo*. Figure 41.

Moist or wet, mixed, mountain forest, 1200–2600 meters; Quezaltenango (type from Quebrada San Gerónimo, Finca Pirineos, lower slopes of Volcán de Santa María, *Steyermark 33479*); San Marcos; Sololá; Suchitepéquez. Southern Mexico (Chiapas).

Plants slender, solitary, erect, sometimes acaulescent, with slender prop roots, the caudex generally 1–1.5 meters high, 6–8 mm. thick, the internodes 5.5–7 cm. or sometimes much shorter; leaf sheaths 7–12 cm. long, 8–14 mm. thick, oblique above, prominently striate-nerved, the petiole short, slender, 2.5–5 cm. long or rarely somewhat longer but shorter than the sheath, the blades rather small, thin, almost concolorous or slightly paler beneath, simple and 7-nerved or usually pinnate with 1–3 pairs of alternate sigmoid pinnae to 13 cm. long and 2.5 cm. wide, the lowest smaller than the others, each with a central primary nerve and 2 pairs of slightly less conspicuous secondary nerves on each side, the terminal pair with

4-6 keeled primary nerves on each side and 1-3, generally 2, secondary nerves between them, 13-17 cm. long on the upper margin, 7.5-8.5 cm. along the rachis when simple, 4-6 cm. along the rachis when pinnate, then the entire rachis to 12 cm. or very rarely to 18.5 cm. long, all the pinnae falcate-acuminate; peduncles 11-20 cm. long, very slender, scarcely 2 mm. thick near the apex, ascending or spreading; spathes 3-4, tubular, appressed, scarcely more than 3 mm. broad, striate-nerved; staminate spadix simple or often composed of 2-3 branches, the branches densely flowered to the base, nodding, 7-20 cm. long, 4 mm. thick, the flowers strongly nerved when dry, deeply immersed, the calyx 1-1.5 mm. high, connate at the base in a short tube, with rounded lobes conspicuously imbricate above, the petals connate and laterally compressed in a linear base, expanded above and connate at the tips, the corolla opening by lateral slits, stamens with short filaments and anthers entire at the apex, pistillode columnar, truncate; pistillate spadix simple or composed of 2 branches, these orange in fruit, 7-9 cm. long, the flowers remote, spirally arranged, rather few, deeply immersed, the alveolae oblong or oval, 2.5 mm. long, the calyx very short, obscurely 3-lobed; petals irregularly rounded, prominently striate-nerved; fruit at first orange, at maturity purple-black, subglobose or ovoid-ellipsoid, when dry 7-9 mm. long.

Related to *C. simplex* with which simple-leaved forms have been confused. The present species is named for Professor Ulises Rojas, formerly Director of the Jardín Botánico of Guatemala, on and near whose *finca*, Pirineos, many of the known specimens of the species have been collected.

**Chamaedorea Schippii** Burret, Notizbl. Bot. Gart. Berlin 11: 1038. 1934.

Moist or wet, mixed forest, often on limestone, 700 meters or lower; Alta Verapaz. British Honduras.

Plants forming colonies by rhizomes, the stems separated, not cespitose, to 3 meters high or more, to 2.5 cm. in diameter; leaves to 1.2 meters long, regularly pinnate, the sheath 18-19 cm. long, tubular for about three-fourths its length below an oblique, dark-margined orifice, the petiole 15-25 cm. long, green below as is the rachis, the latter at first cinereous furfuraceous becoming glabrate or glabrous, 8-9 dm. long, with about 30 narrowly linear acute to acuminate straight pinnae on each side, all except the somewhat wider terminal 2-nerved pair with a single prominent central nerve scarcely keeled above, the pinnae when dry slightly plicate; pistillate peduncle erect from below the leaves in fruit, slender, 15-20 cm. long, subtended by 5 tubular spathes, the upper ones slightly inflated and oblique at the apex; the pistillate spadix rather small with about 12 ascending branches, these stout, curved-ascending, commonly 6-8 cm. long, red in fruit; fruits globose, black at maturity, 8 mm. in diameter, superficial and rather densely disposed, the calyx 3-lobed, the lobes broadly rounded, petals about 2 mm. long, imbricate, broadly ovate, staminodes not apparent, abortive carpels adherent to the fruit.

The species was described from fruiting material which was compared with *C. graminifolia*. The latter, described from cultivated material possibly of Guatemalan origin, is very similar but differs,



according to Burret, in the elongate fruit with embryo near the middle of the seed.

**Chamaedorea simplex** Burret, Notizbl. Bot. Gart. Berlin 11: 758. 1933.

Wet, mixed forest, often on rocky hillsides, 1350–1440 meters, endemic; Alta Verapaz (type collected by Tuerckheim in the Cobán region; known also from Pansamalá, Purulhá, and rather frequent in the forest between Cobán and San Pedro Carchá).

Plants slender, the stems decumbent and rooting at the base (colonial?) but erect for 1–1.5 meters, 5–6 mm. in diameter, green, the leaf scars 2.5–7 cm. apart; leaves few, scattered along the upper part of the stem usually for half the length of the caudex or less, the sheaths 7–9 cm. long, cylindric, obliquely open for 1.5–2 cm. at the apex, green, conspicuously nerved, closely appressed, the petiole 2.5–14 cm. long, generally shorter than the sheath, leaf blades simple, cleft for three-fourths their length or more, the rachis 2–5 cm. long, the lobes broad, divergent, somewhat sigmoid, short-acuminate, curved along the outer margin, as much as 20 cm. long on the upper margin and 5 cm. wide, usually smaller, 6–7-nerved, the nerves prominently keeled above; pistillate inflorescences borne in the axils of live leaves, with several narrow spathes, 20–26 cm. long above the sheaths, simple, the spike 8–9 cm. long, becoming orange in fruit; fruits rather laxly disposed in distinct but not deep depressions in the axis, the perianth in fruit prominently nerved when dry, with distinctly 3-lobed calyx about 1.5 mm. high, and imbricate, somewhat gibbous petals 2–2.5 mm. high, staminodes apparently lacking, abortive carpels adherent to the fruit; fruit ellipsoid or oblong, about 9 mm. long and 7.5 mm. broad, becoming black and shining at maturity, the seed subglobose, 5 mm. in diameter.

All the material assigned to this species is either sterile or in fruit. Staminate flowers are not certainly known but are probably very similar to those of closely related *C. Rojasiana*. This is one of the neatest and, in some respects, the handsomest of the Guatemalan *Chamaedorea* species, of very distinctive appearance and easily recognized even in the sterile state. The leaves are small and, according to Burret, more deeply divided than in any other species, short and with widely spreading divisions.

**Chamaedorea Skutchii** Standl. & Steyerl. Field Mus. Bot. 23: 206. 1947.

Known only from the type, Quezaltenango, Volcán de Zunil, 2400 meters, *A. F. Skutch 935*.

Caudex slender, 2.5 meters high, 8–12 mm. thick; the internodes 2.5–4 cm. long; petiole 22 cm. long or more, the blade pinnate, pinnae 9–11 on each side of a pale-backed rachis 22–27 cm. long, the upper pair 4–6-nerved, about 20 cm. long on the upper margin to 6 cm. wide, falcate-acuminate, the outer side inconspicu-

ously crenate-serrate, the other pinnae regularly disposed, mostly alternate, 15–21 cm. long, 13–16 mm. wide, not sigmoid, subfalcately long-attenuate, 3-nerved, the primary nerves slightly keeled and pale above, pale and shining below, the secondary nerves very slender; pistillate inflorescences arising below the leaves, the slender peduncle 25–31.5 cm. long, almost 4 mm. thick at the apex in fruit; spadix orange in fruit, with about 7 rather markedly undulate branches, especially so toward the tip, the nerveless flowers borne in a loose spiral, somewhat longer than broad, distinctly sunken in slightly curved elliptic pits bordered on the lower side by a liplike margin, the sepals essentially free, imbricate and slightly gibbous at the base, about 1 mm. high, petals imbricate, subacute to rounded, about 1.5 mm. high, becoming brown and narrowly dark-margined in fruit, the one covering the abortive carpels scarcely exceeding the calyx, the other two about twice as long as the sepals, staminodes absent, abortive carpels adherent to the perianth in fruit; fruit obovoid-globose, about 10 mm. high, 8 mm. in diameter; seed globose-ovoid, 8 mm. long.

*Chamaedorea Skutchii* resembles *C. nubium* in the undulate branches of the inflorescence but is distinguished from that species by its imbricate pistillate sepals, shallower pits, and lack of staminodes.

***Chamaedorea stenocarpa*** Standl. & Steyerl. Field Mus. Bot. 23: 206. 1947.

Known only from the type; Izabal, Cerro San Gil, 650–900 meters, *Steyermark 41893*.

Plants small, acaulescent, about 60 cm. high; leaves 5 or more, small, 60 cm. long or shorter, the open sheaths 4–4.5 cm. long, narrowed upward, striate-nerved, the slender petioles 12–20 cm. long, very sparsely verrucose or smooth, the rachis 14–27 cm. long, pale-backed and verrucose-margined toward the apex below, strongly verrucose and angled above, narrowly margined with decurrent bases of pinnae, the blades pinnatisect, 14–32 cm. long, 10–20 cm. wide; pinnae 10–14 on each side, thin, concolorous, regularly distributed, the middle ones 5.5–12 cm. long, 1.2–2.5 cm. wide, narrowly oblong-lanceolate, falcately acuminate, narrowed to the base, the basal line of attachment about 8 mm. long, the segments 3-nerved, the primary nerves slender but prominently keeled, verrucose at least near the base, the secondary nerves solitary between the primary ones, very slender and inconspicuous, the lower margin shallowly toothed toward the apex; terminal pinnae 5–7.5 cm. long, 8–15 mm. wide, 2–3-nerved; pistillate peduncle slender, erect, straight, 18 cm. long, 1.5 mm. thick near the apex; spathes 4 or perhaps 5, narrowly tubular, almost 3 mm. in diameter, closely appressed, oblique at the apex, conspicuously nerved; spadix rather stout, straight, 4 cm. long, deep orange, the flowers rather densely disposed, scarcely immersed, spirally arranged, the alveolae elliptic, 1.8 mm. long; calyx minute, not nerved, very shallowly 3-lobed; petals not nerved, almost 3 mm. long in fruit, rounded-ovate, obtuse, free and imbricate; immature fruit oblong-ellipsoid, when dry 8 mm. long and 4 mm. broad, obtuse or rounded at the apex, obtuse at the base, abortive carpels adherent to the perianth.

One of the smallest of Guatemalan palms, noteworthy for the numerous, very thin, deep green pinnae, and more especially for the very short simple spadix bearing numerous oblong-ellipsoid fruits.

***Chamaedorea stricta*** Standl. & Steyer. Field Mus. Bot. 23: 207. 1947.

Moist or wet, dense, mixed mountain forest 1400–1700 meters; endemic; San Marcos (Volcán de Tajumulco; type collected on narrow dry ridge above Finca El Porvenir, up Cerro de Mono, *Steyermark 37381*; also between Todos Santos Chiquitos and Loma de la Paloma).

Plants acaulescent; leaves 2–3, erect, rather stiff, concolorous or somewhat paler beneath, simple, the sheath 8–27 cm. long, open, attenuate upward, striate-nerved, rather lax, the petiole 28–35 cm. long, as much as 7 cm. thick; leaf blades 20–60 cm. long, 13–23 cm. wide, cuneately narrowed at the base, deeply bifid at the apex, the rachis 14–30 cm. long, the lobes long-acuminate, directed forward, the primary nerves 12–24 on each side, prominent below, the secondary nerves numerous, very slender and inconspicuous; peduncles arising from the base of the plant, erect, slender, but rather stiff, 80–100 cm. long, 2 mm. thick near the apex; spathes 7–10, narrowly tubular, closely appressed, pale green, with very slender nerves, the lowest spathes only 7 cm. long, the middle ones 11–28 cm. long, 4 mm. in diameter, oblique at the apex; staminate spadix about 24 cm. long, the rachis 3.5 cm. long, the branches 7, densely flowered almost to the base, slender and somewhat flexuous, the flowers rather deeply set in narrowly elliptic alveolae 2.5 mm. long, the calyx very short, 2.5 mm. broad, very shallowly 3-lobed; petals not nerved, free, broadly ovate, obtuse, almost 4 mm. high, erect; branches of the pistillate spadix 3–4, erect, rather stout, 8–14.5 cm. long, the flowers remote, spirally inserted, the rachis 1.5–3 cm. long, red-orange, the flowers scarcely immersed, the alveolae elliptic or oval, 2.5 mm. long; calyx 3.5 mm. long, deeply 3-lobed, petals not nerved, almost orbicular, subapiculate, 3 mm. long and wide, staminodes present and prominent in the fruiting corolla; fruit subglobose, 8 mm. long and almost equally broad, broadly rounded; seed globose, whitish brown, almost as large as the dry fruit.

Among the few species with simple leaves, this is outstanding because of the greatly elongate, stiffly erect, radical inflorescences. The foliage and the closely sheathed elongate peduncles are strikingly similar to those of *C. Ernesti-Augustii*. The flowers of both sexes, however, are quite different and the pistillate spadix is few-branched rather than spicate.

***Chamaedorea tenerrima*** Burret, Notizbl. Bot. Gart. Berlin 11: 858. 1933. *Lobia erosa* O. F. Cook, Nat. Hort. Mag. 22: 148. 1943; 26: 20, f. 4. 1947, without Latin description.

Dense, wet, mixed, mountain forest, 900–1600 meters; Alta Verapaz (type collected above Tactic, on Río Cobán, *F. C. Lehmann 1312*; rather common in this general region, but found elsewhere only at Chihob).

Plants small, generally a meter high or lower, the caudex very slender, 3–7 mm. in diameter, green, remotely annulate, often decumbent, the upper internodes 2 cm.



long; sheath long and cylindric, the strongly rugose petiole 4–8 cm. long, pale below as is the rugose rachis, this 6–15 cm. long; leaf blades thin, green on both surfaces, broadly obovate in outline and simple with 9–10 pairs of primary nerves, rounded to subacute at the base, cleft at the apex with upper margins to 14 cm. long, or pinnate with a broad 3–8-nerved apical pair of pinnae and 2–6 pairs of short, strongly sigmoid, mostly 3-nerved pinnae with the lower margin produced in a prominent auricle, outer margins minutely scarious-roughened, mucronulate and emarginate at the tips of the nerves and rather sharply toothed between them; staminate spadices solitary at nodes below the leaves, to 12 cm. long, subtended by 5 cylindric spathes, with about 10 small slender branches from a rachis 4.5 cm. long, the flowers (known only in immature state) superficial in a loose spiral, depressed-globose, the calyx shortly cupular, 3-lobed, anthers entire at the apex, pistillode short, cylindric; pistillate spadix from below the leaves (in fruit) with a very slender peduncle 8–15 cm. long, the rachillae 2–3, very slender, 3–6 cm. long, recurved and red in fruit; fruits few, seated on superficial widely spaced rounded cushions, globose, black at maturity, 6–7 mm. in diameter, the corolla nerveless, red-brown when dry without a brown margin, staminodes present, abortive carpels apparently adherent to the perianth; seed globose with embryo below the middle.

The leaves of *C. tenerrima* are variable. A pistillate plant in which the blade is nearly completely pinnate was illustrated by O. F. Cook (Nat. Hort. Mag. 26: 19. 1947) under the invalid name *Lobia*.

**Chamaedorea Tepejilote** Liebm. in Martius, Hist. Nat. Palm. 3: 308. 1849; Bot. Mag. *pl.* 6030. 1873. *Stephanostachys Tepejilote* Oerst. Vid. Medd. Kjoebenhavn 1858: 27. 1859. *Nunnezhara Tepejilote* Kuntze, Rev. Gen. 2: 731. 1891. *Stephanostachys Wendlandiana* Oerst. Vid. Medd. Kjoebenhavn 1858: 28. 1859. *Chamaedorea Wendlandiana* Hemsl. Biol. Centr. Amer., Bot. 3: 407. 1885. *Nunnezhara Wendlandiana* Kuntze, Rev. Gen. 2: 730. 1891. *Chamaedorea exorrhiza* Wendl. ex Guillaumin, Bull. Mus. Hist. Nat. Paris 28: 542. 1922. *Chamaedorea anomospadix* Burret, Notizbl. Bot. Gart. Berlin 11: 763. 1933. *Edanthe veraepacis* O. F. Cook & C. B. Doyle, Nat. Hort. Mag. 18: 174, f. 1–9. 1939 without Latin diagnosis (based on material from Cobán, Alta Verapaz). *Pacaya*; *Ixqui-quib* (staminate plant), *Telom-quib* (pistillate plant; Quecchí, fide Cook); *Chimp* (San Marcos); *Bojón* (Quezaltenango, San Marcos); *Aula-té* (Alta Verapaz); *Ternero* (Cobán); *Pacaya Grande*; *Chem-chem* (Alta Verapaz). Figure 41.

Moist or wet, mixed forest, 1600 meters or lower, and often planted for food or for ornament; Alta Verapaz; Izabal; Suchitepéquez; Quezaltenango; San Marcos; Petén; Huehuetenango; doubtless planted in several other departments—Guatemala, Escuintla, Santa Rosa, Sacatepéquez. Eastern Mexico to Colombia.

Plants solitary or sometimes clustered but perhaps the individuals distinct, erect or sometimes decumbent at the base, often with more or less prominent prop

roots, the caudex 2-7 meters high or more, 1.8-10 cm. in diameter, with internodes 4.5-6.5 cm. long or more; leaves pinnate, large, the sheath cylindric, striate-nerved, elongate, oblique at the apex, the petiole stout, elongate, 10-47 cm. long, pale-backed as is the rachis, this 6-14 dm. long with 12-25 subopposite pinnae on each side at regular intervals; pinnae broadly linear-lanceolate to long-lanceolate, narrowed and sigmoidly curved at the base, falcately narrowed at the apex, the larger median pinnae 16-70 cm. long, 3.5-7.5 cm. wide, thin, the primary nerves generally 5 but sometimes to 8, keeled above, yellowish and shining below with 4-5 or even more secondary nerves interspersed, some or all of these sometimes nearly as prominent as the primary nerves; especially in large pinnae, the tertiary nerves fine and numerous; inflorescences borne below the leaves, solitary at the nodes, subtended by 4-5 spathes, the lower short and truncate, the upper rather prominently inflated and hoodlike, rather soon marcescent; staminate peduncles 6-17 cm. long with 18-50 (or more) slender, usually spreading or pendulous branches 7-15 cm. long from an axis 6-22 cm. long, the flowers bright yellow, not nerved, somewhat fleshy, seated in shallow elliptic depressions, very densely crowded in lines, these numbering 6-7 near the base and often only 4 near the apex or 4 nearly throughout, the calyx very short, membranous, annular, about 0.3 mm. high, partially adherent to the sides of the alveolae and similarly shaped, petals about 2.5 mm. long, appearing as though united basally because of crowding but essentially distinct with deltoid upper halves inflexed in bud, the tips spreading at anthesis, stamens with elongate filaments and small ellipsoid anthers separated at the base, entire at the apex, pistillode slender, about as long as the stamens; pistillate peduncles 10-27 cm. long with 4-17 or more thickish, straight or flexuous, somewhat angled branches 3-30 cm. long from an axis 1.5-28 cm. long, the whole becoming orange in fruit, the flowers not nerved, slightly immersed in rounded shallow depressions and rather densely to loosely spiralled, about 2.5 mm. high, the calyx very small, 0.5-1 mm. high, annular, becoming undulate in fruit, the petals imbricate and broadly ovate, not gibbous at the base, usually undulate and brown-margined in fruit; staminodes lacking, the pistil with sessile stigmas, abortive carpels generally adherent to the fruit; fruit ovoid to usually ellipsoid, blue-green maturing black, 13-15 (to 20 when fresh) mm. long, 7-8 mm. in diameter.

*Chamaedorea Tepejilote* is a most variable species throughout its wide range. Segregates have been proposed based principally on size and number of parts, but it is difficult to find constant supporting characters. Inflorescences may differ greatly in size on a single plant in the wild state and tend to be especially large on cultivated plants. Size and nervature of pinnae are also variable. Plants from Izabal and Alta Verapaz which agree well with the description of *C. anomospadix* apparently sometimes form clumps of several stems. Whether this is due to the development of rhizomes or to growth of several individuals in close proximity is not known. In other respects, differences are of size, not of character.

In Guatemala, this species is not confined to the Cobán region, although it is perhaps more abundant there than elsewhere, and certainly is cultivated and exploited there for market much more than in any other part of Central America. It is the best of the pacayas



for eating, but it is by no means the only one used for food. The region in which most attention is given to cultivation and sale of this particular pacaya is Tactic, where there are large plantations of the palm. The cultivated plants commonly are considerably larger and bear larger inflorescences than those growing wild in the forests, and because the inflorescences are larger, they are more desirable for food.

The best pacayas produced in Alta Verapaz bear a striking similarity to roasting ears (of maize) covered with their husks, and in size they are more like field corn than sweet corn. On wild plants, the corresponding organs are often not more than half as large. The specific name of this palm is of Nahuatl origin, signifying mountain maize. In Guatemala, this name is replaced by the term "pacaya," the name given to all Guatemalan pacayas, edible or otherwise. The origin of the word "pacaya" is unknown (the Indians of Cobán have abbreviated it, as they have done with many other words, and call the palm "pacai"), but since it is of wide use in Central America as well as in South America, one may guess that it is of Quechua derivation, like the word "chonta," in wide use for various kinds of palms, although not so used in Guatemala.

**Chamaedorea Tuerckheimii** (Dammer) Burret, Notizbl. Bot. Gart. Berlin 11: 766. 1933. *Malortia Tuerckheimii* Dammer, op. cit. 4: 157. 1904. *Kinetostigma Tuerckheimii* Burret, op. cit. 11: 317. 1932.

Endemic; type collected in the mountains near Cobán, Alta Verapaz, at 1500 meters, *Tuerckheim 8603*; sometimes cultivated for ornament in the gardens of Cobán and introduced into cultivation in Europe.

Plants rhizomatous and probably colonial, dwarf and very slender, sometimes a meter high but flowering when not more than 30 cm. high, the green caudex 3–4 mm. thick, conspicuously annulate, the leaf scars 1–2 cm. apart; leaves few or numerous, very small, the sheaths cylindric, oblique at the apex, 5 cm. long, rather closely appressed, the petioles 5 cm. long or shorter, the blades cuneate-obovate, 12–18 cm. long, 3.5–7 cm. wide, rounded or obtuse at the apex, rather coarsely crenate, very closely plicate, with about 19 nerves on each side of a pale-backed rachis which is verrucose above, deep dull velvety green on the upper surface, slightly paler beneath; peduncles about 10 cm. long or more, from the leaf axils, the spathes thin, very slender, the uppermost obliquely split on one side, the staminate spadix small with about 7 slender branches to 4 cm. long from a very short rachis, the flowers in bud nerveless, superficial in a loose spiral; pistillate spadix simple, thickened and orange in fruit, the fruits superficial in a loose spiral, remote, purple-black, ovoid, 8 mm. long or larger.



This is one of the smallest palms known and one of the most distinct. It is exceptionally attractive because of its dwarf habit and the handsome leaves of unique form. In the living state, the leaves have a decidedly velvety appearance; they are smaller than those of any other Central American palm and probably are the smallest leaves produced by any palm in the world. The plant thrives in the gardens of Cobán, although it seems to be little esteemed. We have not seen the plant wild but it is brought into Cobán in small quantities by the men who peddle orchids. They must know where it grows in at least small numbers, but are unwilling to reveal the secret. They say that it comes from the "tierra caliente," but if the elevation indicated by Tuerckheim is correct, their statements are untrue.

***Chamaedorea vulgata*** Standl. & Steyerl. Field Mus. Bot. 23: 208. 1947. *Cum* (San Marcos); *Pacaya*.

Moist or wet, mixed, mountain forest, 1300–2350 meters; endemic; Quezaltenango (western slopes of Volcán Zunil); San Marcos (type from Volcán de Tajumulco, between Finca El Porvenir and Loma Corona, 9 miles northwest of El Porvenir, *Steyermark 37735*).

Plants erect with caudex commonly 2–3 meters high, about 1.5 cm. in diameter, green, conspicuously annulate, the internodes more than 10 cm. long; leaves large, pinnate, the petiole 50–75 cm. long, 7–9 mm. thick, straight; pinnae about 10 on each side of a green-backed rachis, regularly disposed, mostly alternate, thin, deep green, concolorous, linear-lanceolate, the median about 50 cm. long, 7.5 cm. wide, not sigmoid, attenuately long-acuminate with nearly straight upper margin and falcately curved lower margin, gradually narrowed to the base, 3–3.5 cm. wide on larger pinnae, primary nerves 5, keeled above, yellowish, shining and prominent below, the secondary nerves 1–3 between the primary nerves, shining below, not keeled above, tertiary nerves fine and numerous, the pinnae only slightly decrescent in size toward the apex and base of the blade; inflorescences arising below the leaves, the peduncles stout, 25–60 cm. long, 2–4 mm. thick at the apex in fruit, spreading, subtended by 5 (♂) –6 (♀) tubular subappressed spathes 6–12 mm. broad, the lowest only 2.5 cm. long, the uppermost about 21 cm. long, acute, oblique at the apex, striate-nerved; rachis of the staminate spadix 4–8 cm. long with 9–12 pendulous branches 15–25 cm. long, the green nerveless flowers about 3 mm. high, superficial, moderately densely spiralled, calyx about 1 mm. high, 3-lobed and -angled, petals valvate, not connate apically, stamens with rather short filaments and elongate anthers generally briefly bifid at the apex, pistillode columnar, somewhat thickened, 3-angled and truncate at the apex; rachis of pistillate spadix 1–4 cm. long with 3–6 branches 15–27 cm. long, becoming orange, thickened, and pendulous in fruit, the flowers superficial, nerveless, rather densely spiralled, the calyx about 1 mm. high, 3-lobed, petals rather strongly imbricate, acute, staminodes lacking, pistil ovoid with sessile stigmas, the abortive carpels adherent to the fruit; fruit probably black at maturity, dull rich green when immature, obovoid, 8–9 mm. long; seed globose.

Because of the strongly nerved large pinnae, this species may be confused with *C. Tepejilote* from which it differs strikingly in characters of the inflorescence, flowers and fruit.

The distribution indicated here is rather more limited than that in the original description due to inclusion of extraneous elements in the latter.

#### DOUBTFUL SPECIES

*Chamaedorea Deckeriana* (Klotzsch) Hemsl. Biol. Centr. Amer., Bot. 3: 404. 1885. *Stachyophorbe Deckeriana* Klotzsch in Otto & Dietr. Allg. Gartenz. 20: 364. 1852. *Dasystachys Deckeriana* Oerst. Vid. Medd. Kjoebenhavn 1858: 25. 1859; Amér. Centr. 14. pl. 6. 1863. *Nunnezhara Deckeriana* Kuntze, Rev. Gen. 2: 731. 1891.

Described from cultivated plants said to have been sent from Guatemala by Warscewicz. Represented in the Herbarium of Chicago Natural History Museum by a photograph of type material (Negative 20757).

The species is native in Costa Rica and does not appear to occur north of that country.

*Chamaedorea Warscewicziana* Wendl. Bonplandia 10: 37. 1862. *Nunnezhara Warscewicziana* Kuntze, Rev. Gen. 2: 731. 1891.

Described from cultivated plants believed to have been of Guatemalan origin. Represented in the Herbarium of Chicago Natural History Museum by a photograph of the type (Negative 20771). The species is reported by Burret from Costa Rica and has not appeared in collections from Guatemala.

#### COCOS L. Coconut

Tall, unarmed palms, the trunk thick, annulate; leaves terminal, pinnatisect, the segments lanceolate, the rachis subtrigonal, convex dorsally, the sheath short, open, fibrous; spadices inserted among the leaves, erect at first, recurved in age; lower spathe short-cleft at the apex, the upper one fusiform, ligneous; flowers monoecious in the same spadix, bracteate, the staminate solitary or geminate along the upper part of the branchlet, the pistillate inserted below, scattered; staminate sepals small, acute, erect, valvate, the petals obliquely oblong, acute, valvate; stamens 6, included, the filaments subulate, the anthers linear, erect, affixed by the bifid base; pistillate flowers much larger than the staminate, ovoid, the perianth accrescent after anthesis, the sepals thick-coriaceous, erect, imbricate, the petals shorter than the sepals, coriaceous, convolute-imbricate, connivent-valvate at the apex; ovary 3-celled, attenuate to a short style, the stigmas subulate, finally recurved; ovules subbasal, ascending; fruit large, 1-seeded, the style ter-

minal, the pericarp very thick and fibrous, the endocarp osseous, 3-pored near the base; seed very large, the surface reticulate by the branches of the raphe, the endosperm uniform, hollow, the embryo opposite one of the pores.

As now interpreted, the genus consists of a single species, of almost universal distribution on tropical seacoasts. Numerous American palms that in the past have been referred to *Cocos* are now placed in other genera.

**Cocos nucifera** L. Sp. Pl. 1188. 1753. *Cocotero*; Coc (Quecchí).

Common along both coasts of Guatemala and abundantly planted at low or even at fairly high elevations.

The coconut, in some regions of the earth a plant of prime economic importance, is too well known to need detailed description. The plant is the basis of such a vast literature and it supplies so many economic products that a volume would be needed to treat the subject fully. In Guatemala and other parts of Central America, however, the coconut, although seen almost everywhere at low elevations, is of relatively little economic importance. From the coast of British Honduras large quantities of ripe coconuts are shipped to the United States, and perhaps some are exported from the north coast of Guatemala. In Central America the meat of the nuts is used for making several popular varieties of sweetmeats, especially the often delicious "conserva de coco," a soft candy prepared with either crude or refined sugar. More important, perhaps, are the tender green fruits, "cocos tiernos" or "cocos de agua" (called "pipas" in southern Central America), which supply a colorless sweet liquid of delicious flavor, which always is cool, no matter how torrid the atmosphere. This beverage is particularly welcome in areas in which the usual water supplies are suspected.

Ripe coconuts, which are useless for beverage purposes, are carried to all parts of Guatemala from the lowlands, and their meat is used in making sweetmeats. The ripe fruit is called "coco de carne," the green fruit "coco de agua." The fruits on sale at Quezaltenango showed remarkable variations in shape—much more than are ordinarily observed. It is stated that in some parts of Guatemala there are trees that produce abnormally small fruits. When the coconut germinates the ordinarily empty cavity is filled with the expanding embryo, which is white and spongy with a texture almost like that of a mushroom. This is considered a great delicacy by some people, especially children, and the nuts sometimes are germinated especially for food.



The coconut is in some respects the most picturesque and attractive tree of Central America, infinitely varied in form, but always graceful and beautiful. Its groves fringe most of the Guatemalan seashores except those bordered by mangrove swamps, and handsome groups of trees extend far inland. The trees thrive and produce fruit far from the influence of salt water, but when planted at high elevations, as about Guatemala, they seldom produce fruit. Notwithstanding its present great abundance in Central America, where it spreads freely without the aid of man, the coconut is believed to have been imported from the Pacific islands. The date of introduction into America is unknown, and it may well have been long prior to the arrival of European people. The buoyant fruits, which readily germinate on seashores, are easily transported by sea currents to remote lands.

Coconut palms, when available, seem to be the favorite nesting places of those almost domestic Central American birds, the zanates, which, although they may be dear to the hearts of the people, are a nuisance in more ways than one, and sometimes a great pest, especially to newly planted or sprouting corn. The coconut trees also are filled with wasps' nests, but the zanates and wasps live amicably together. Predatory animals, especially rats, often climb the trees in search of eggs and young birds, especially at night, whereupon a regular bedlam prevails, and in the morning the ground is strewn with eggshells and dead nestlings.

For one who wishes to become familiar with the flower and fruit structure of the palms, the coconut is the best plant with which to begin. Both its flowers and fruits are large, and the structure of the fruit is known to almost everyone. The fruit exhibits clearly and on a large scale the structure that characterizes even the smallest fruits of other palm genera.

### CRYOSOPHILA Blume

*References:* Beccari, *Webbia* 2: 230. 1907 (as *Acanthorhiza*); Bartlett, *Carnegie Inst. Wash. Publ.* 461: 37. 1935.

Low or tall palms, the trunk cylindric, annulate, bearing near the base spinose adventitious roots; leaves flabellate, deeply cleft into 2-4 principal segments which are united only at the base, these divided into several acuminate segments with filaments between them; petiole unarmed, with a distinct ligule; rachis none; spadices borne among the leaves, short, 2-3-branched, the ultimate branchlets elongate, the flowers perfect; spathes and bracts elongate, coriaceous, deciduous, the bractlets setiform, deciduous; flowers globose, perfect, carnos, closed in anthesis, subsessile, solitary; calyx of 3 free sepals; petals about equaling the sepals, sub-

orbicular, convolute-imbricate; stamens 6, the filaments united to form a tube and free only at the apex, the anthers ovate-oblong, dorsifixed near the base; carpels 3, completely free, attenuate to a filiform style, stigmatiferous at the apex but not thickened, the single ovule in each cell basal, erect; perianth slightly accrescent in fruit; fruits medium-sized, globose-oblong, the pericarp scant, spongy-fibrose, the endocarp thin-membranaceous; raphe short and inconspicuous, the endosperm undivided (not ruminant).

Eight species are reported for the genus, ranging from southern Mexico to Colombia. From Central America five others have been described, in Costa Rica and Panama.

***Cryosophila argentea*** Bartlett, Carnegie Inst. Wash. Publ. 461: 40. pl. 2-5. 1935. *Acanthorrhiza Collinsii* O. F. Cook, Nat. Hort. Mag. 20: 50. 1941. *Cryosophila bifurcata* Lundell, Wrightia 1: 53. 1945. *Escoba*; *Acuum* (Maya).

Moist or wet, mixed, lowland forest, 900 meters or lower; frequently growing on limestone; Petén; Alta Verapaz; Izabal. Campeche; British Honduras (type from Cornhouse Creek, Manatee River, Belize District, *H. H. Bartlett 11288*). Figure 42.

Plants slender, as much as 8 meters tall, the trunk about 5 cm. in diameter, covered with pungent, simple or branched, spinose rhizoids; leaf blades flabellate, about 44-costate, cleft medially almost to the petiole and about 9-cleft on each side, the ultimate segments simple and 1-costate, about 3 cm. wide, or 2-4-costate and 8 cm. wide, sparsely pilose or glabrate above, silvery beneath, with parallel, appressed, white and ferruginous hairs; petioles 70-120 cm. long, appressed-ferruginous-furfuraceous beneath, green above, 1 cm. thick at the base, 8 mm. broad above; ligule triangular, the sheath sordid-lanose, divided apically into long fibers; spadix nutant, 60-70 cm. long, subtended by whitish, tomentose or glabrate, striate, concave spathes 14-20 cm. long, the peduncle fleshy, floccose-lanate, the whole inflorescence laxly twice-branched; flowers glabrous, 4.5 mm. long, 3.2 mm. broad; calyx segments connate for a third their length, acute, scarcely equaling the petals; petals imbricate, subinvolute, 3 mm. long and broad, in fruit 5 mm. long, gibbous outside at the base, carnos, rounded at the apex, the margins thin and hyaline, minutely denticulate; ripe fruit yellowish or whitish, subglobose, 12 mm. in diameter; seed 8-10 mm. in diameter.

Called "palma de escoba" in Campeche, and "give-and-take" in British Honduras. This is presumably the palm that has been reported from British Honduras as *Cryosophila nana* (HBK.) Blume ex Standley.

Judging from the description, *C. bifurcata* does not differ significantly from *C. argentea*. Leaf segments with briefly bifid apices, the apparent distinguishing factor, are usual in *Cryosophila*. Lundell did not contrast his species with *C. argentea*, to which it would key out in Bartlett's treatment. The type was collected on the Punta Gorda-



FIG. 42. *Cryosophila argentea*. a, Fruiting branch with leaf attached to stem ( $\times \frac{1}{9}$ ). b, Fruit ( $\times 1\frac{1}{2}$ ). c, Portion of trunk showing spines ( $\times \frac{1}{6}$ ).



San Antonio Road near Jacinto Creek, Toledo District, British Honduras, *Gentle 4972*.

### DESMONCUS Martius

*References:* M. Burret, Die Palmengattung *Desmoncus* Mart., Repert. Sp. Nov. 36: 197–221. 1934; H. H. Bartlett, Certain *Desmonci* (*Palmae*) of Central America and Mexico, Journ. Wash. Acad. Sci. 25: 81–88. 1935.

Very spiny, scandent palms, with elongate, flexuous, annulate stems, the spines straight or hooked; leaves distant, subsessile, pinnatisect, the segments opposite and alternate or scattered, acuminate, shortly narrowed at the base, the rachis of the leaf ending in a long, whip-like portion armed with numerous abruptly reflexed, stout spines, the petiole short, the sheath elongate, produced above as an ocrea; spadices solitary, small, the branches slender, fastigate, flexuous, the flowers monoecious, on the same spadix, bracteate and bracteolate, greenish; spathes 2, the lower one short, coriaceous, open at the apex, the upper subligneous, cylindric, cleft ventrally; staminate flowers numerous on the upper part of the branches, the lower flowers pistillate, solitary or subtended on each side by staminate flowers; staminate calyx minute, membranaceous, trifid or trigonous, the 3 petals thicker, obliquely ovate or lanceolate, acute or acuminate, valvate; stamens 6, included, the filaments subulate or filiform, the anthers linear, bifid at the base, erect; pistillate flowers much smaller than the staminate, coriaceous, the perianth slightly enlarged after anthesis, the calyx cupular, 3–5-denticulate at the apex, the corolla urceolate, truncate or 3-dentate at the apex; ovary ovoid, 3-celled, the style short, with 3 acute, revolute stigmas; fruit small, red, ovoid, obovoid, or globose, 1-celled and 1-seeded, the pericarp thin, fleshy, the endocarp crustaceous or osseous, reticulate-veined, apically or above the middle 3-pored, the pores stellately fibrous; endosperm undivided, the embryo opposite one of the pores.

About 50 species, ranging from southern Mexico to the West Indies and South America. A few others besides those listed here are found in southern Central America. The plants are easy of recognition because of their climbing habit, and the long naked leaf tips, armed with abruptly reflexed spines. They are all too abundant in the lowlands of northern Guatemala, as along the Atlantic coast of Central America generally, often forming dense tangles that reach to the tops of tall trees, and conspicuous because of the bunches of bright yellow fruits. The stems sometimes reach a length of several hundred feet. The plants are a constant menace to a person traveling through the forests, because the stems often dangle loosely from the supporting trees, and the long whiplike leaf tips with their sharp rigid spines inflict painful wounds and are dangerous to the eyes. The strong and flexible stems, like rattan, are sometimes used as a substitute for rope, and around Lake Izabal strips of the bark are used for making the celebrated bayal baskets, one of the distinctive products

of that region. The name "baya" presumably is applied to all local species, which are much alike except in minor details. The name "balaire" is given in Honduras to one or more of the species of *Desmoncus*. The following key to species is taken from that published by Bartlett, except for the addition of *D. leiorhachis*.

Corolla of pistillate flower containing at one side of the ovary a fimbriate, oblong, basally attached scale as long as the corolla lobes; leaflets small, about 1 cm. wide.....*D. anomalus*

Corolla of pistillate flower containing no scale like that described above; leaflets more than 2.5 cm. wide.

Rachis of the leaf unarmed.....*D. leiorhachis*

Rachis of the leaf aculeate and aciculate.

Leaf rachis, even when short-aciculate, also armed below the middle with a few distant, retrorse or subretrorse spines which are the longest ones on the plant.

Lower spathe aciculate; pistillate flowers with annuliform-cupulate calyx, very obtusely 3-apiculate, and a corolla broader than high, almost evenly truncate but sharply though minutely apiculate....*D. Schippii*

Lower spathe almost or wholly unarmed; pistillate flowers with an acutely triangular-cupulate calyx and corolla higher than broad, the margin 3-apiculate from deep, rounded sinuses.....*D. quasillarius*

Leaf rachis sparsely to densely aciculate, with spines no longer than those on other parts of the plant, and not clearly dimorphic.

Lower spathe almost completely unarmed.....*D. uaxactunensis*

Lower spathe aciculate.....*D. ferox*

***Desmoncus aculeatus*** Wendl. Ind. Palm. 20. 1854. *Atitara aculeata* Kuntze, Rev. Gen. Pl. 727. 1891.

According to Burret (Repert. Sp. Nov. 36: 221. 1934), this is a *nomen nudum* and not referable to any known species. The name was based upon Guatemalan material.

***Desmoncus anomalus*** Bartlett, Journ. Wash. Acad. Sci. 25: 84. 1935.

Type from Secanquím, Alta Verapaz, Cook & Doyle 97. Known only from the type material.

Stems very slender; ocrea of the leaf sheath 12 mm. in diameter, 22 cm. long, furfuraceous, appressed-aciculate; petiole 1.5 cm. long, weakly short-aciculate; rachis 165 cm. long, furfuraceous, sparsely armed on the upper surface with spines as much as 12 mm. long; leaflets about 19 on each side, slightly aciculate at the base, the lower ones 22 cm. long and 7 mm. wide, the middle ones 10-12 mm. wide, the uppermost caudate-acuminate; middle leaflets terminating in long portions bearing about 10 pairs of reflexed spines 2.5-6 cm. long; terminal cirrus of the leaf unarmed; lower spathe 28 cm. long, 14 mm. wide, sparsely and shortly appressed-aciculate; peduncle 6 cm. long, armed with spines 4-10 mm. long; rachis whitish, 20 cm. long, sparsely ferruginous-furfuraceous, the flower-bearing branches

about 35, very flexuous, the lower ones 12 cm. long; lower flowers ternate; calyx subannuliform or rounded-triangular, the angles rounded; corolla very obtusely apiculate, bearing within on one side a scale about 2.2 mm. long and as long as the corolla lobes, the scale fimbriate at the apex.

**Desmoncus ferox** Bartlett, Journ. Wash. Acad. Sci. 25: 87. 1935.  
*Bayal.*

Wet mixed lowland forest, at or little above sea level; Petén (type from Tikal, *H. H. Bartlett 12584*; collected also at La Libertad); Izabal; Alta Verapaz. British Honduras. Figure 43.

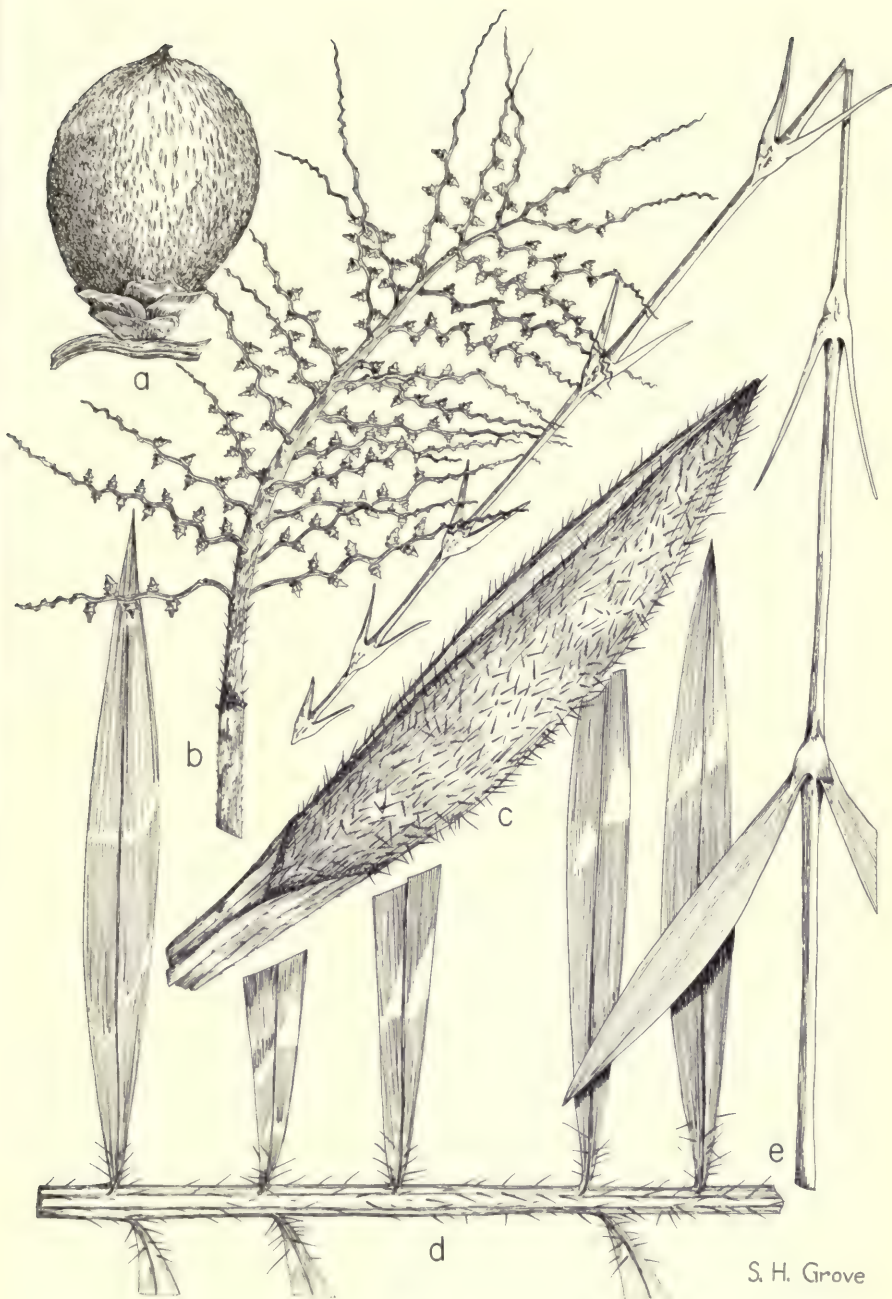
Stems slender, 2 cm. thick, covered by the sheaths, often 10 meters long or more; ocrea of the sheath 25 cm. long, ferruginous-furfuraceous, densely armed with slender, black spines 12–22 mm. long; free portion of the petiole 2–3 cm. long; leaf rachis sparsely ferruginous-pubescent, armed on the upper side with spines 20–28 mm. long or longer, about 2.5 meters long, the cirrhus 1 meter long; leaflets about 24 on each side, the lowest ones 30 cm. long and 1.5 cm. wide, attenuate into a filiform tail 8 cm. long, the middle ones 4 cm. wide, acuminate, the uppermost about 36 cm. long and 4.5 cm. wide, minutely black-pubescent, armed above near the base with numerous spines 3 cm. or more long; leaflets bearing hooked terminal spines only 2, the pairs of spines 10, rigid, the lowest 9 cm. long; lower spathe 22 mm. wide, the closed portion more than 21 cm. long, the open portion 13 cm. long, ferruginous-furfuraceous above and moderately aciculate, the upper spathe fusiform, 40 cm. long, 3 cm. thick, aciculate, the spines 18 mm. long or less; peduncle 7 cm. long, unarmed below, aciculate above, the flowering axis 24 cm. long, unarmed, ferruginous-pubescent, the branches about 40, the lower ones 15 cm. long; pistillate flowers 3 mm. broad, 2.5 mm. high, depressed-globose; calyx subrotund, annuliform, the margin shortly 3-apiculate, 3.3 mm. broad; corolla cyathiform; staminate calyx membranaceous, 3.5 mm. in diameter, triangular, the angles produced and acuminate, the petals deltoid, 8–10 mm. long, acuminate.

**Desmoncus leiorhachis** Burret, Repert. Sp. Nov. 36: 203. 1934.

Type from Río Grande, British Honduras, *Schipp S517a*. Doubtless extending into Petén or the forests of the North Coast of Guatemala, and sterile material from Alta Verapaz probably is referable here.

Leaf sheath about 2.5 cm. in diameter, furfuraceous, armed with black spines 5 mm. long; leaves 1.25 meters long, the cirrhus 50 cm. long, unarmed or with a very few black spines, the hooks about 9 on each side, stout; petiole very short or none, the rachis unarmed; leaflets 26 on each side, the lowest somewhat smaller and narrower, lanceolate, narrow-acuminate, the largest 20 cm. long and almost 2.5 cm. wide, unarmed and glabrous; free portion of the peduncle 10 cm. long, furfuraceous and black-setulose; upper spathe 20 cm. long, narrowly short-acuminate at the apex, 6 cm. broad, armed with black spines about 7 mm. long; rachis of the inflorescence 8 cm. long, with about 20 branches, the longest 10 cm. long; staminate flowers 1 cm. long, the calyx teeth acuminate, the petals lanceolate, acuminate; pistillate calyx annular, the corolla urceolate, the teeth short, broad, subapiculate.





S. H. Grove

FIG. 43. *Desmoncus ferox*. a, Fruit attached to rachis ( $\times \frac{1}{3}$ ). b, Inflorescence with pistillate flowers in position, the staminate fallen ( $\times \frac{2}{5}$ ). c, Spathe of inflorescence ( $\times \frac{2}{5}$ ). d, Middle portion of leaf ( $\times \frac{2}{5}$ ). e, Apex of leaf ( $\times \frac{2}{5}$ ).

**Desmoncus quasillarius** Bartlett, Journ. Wash. Acad. Sci. 25: 85. 1935. *Bayal*.

Moist or wet, mixed, lowland forest, 400 meters or lower; Petén; Alta Verapaz; Huehuetenango; sterile material from Izabal also may belong here. British Honduras, the type from Corozal District, *P. E. Gentle* 348.

Stems 3 cm. thick; ocrea of the sheath 15 cm. long, armed with black spines 1 cm. long or less; petiole about 2 cm. long, sparsely aciculate, the rachis 2 meters long, sparsely ferruginous-furfuraceous, armed above with two kinds of spines, a few of them compressed and almost 14 mm. long, others shorter, all spreading or subascending, armed beneath below the middle with a few stout, reflexed spines 2 cm. long, produced above into an unarmed cirrhous; leaflets about 22 on each side, the lowest 23 cm. long and 14 mm. wide, aciculate above near the base, the middle ones 30 cm. long and 3 cm. wide, acuminate, two of the leaflets produced into an armed appendage, this bearing 9 pairs of recurved spines 7 cm. long; lower spathe unarmed or sparsely aciculate, 14–18 mm. wide, the open portion 7 cm. long, the upper spathe fusiform, 27 cm. long, 22 mm. thick, ferruginous-furfuraceous, short-aciculate, the spines 2–4 mm. long, densely spreading-aciculate above; peduncle 5 cm. long, spreading-aciculate; axis of the inflorescence unarmed, the branches about 35; pistillate flowers conic or subcylindric, the calyx cupuliform, 2.5 mm. broad, 1 mm. high, the margin minutely triapiculate, the corolla 3.5 mm. high, tricuspidate at the apex; staminate flowers 10–12 mm. long, the calyx acutely triapiculate, the angles acute.

Called “basket tietie” and “basket whist” in British Honduras.

**Desmoncus Schippii** Burret, Repert. Sp. Nov. 36: 202. 1934. *D. Lundellii* Bartlett, Journ. Wash. Acad. Sci. 25: 84. 1935 (type from El Paso, Petén, *Lundell* 1555 in April, 1932).

Type from Río Grande, British Honduras, at 45 meters, *Schipp* S517. *Bayal*. Known definitely only from these collections.

Stems scandent to a height of 20–25 meters, 2.5 cm. in diameter; ocrea of the sheath 18 cm. long, armed with black spines 16 mm. long or less; free portion of the petiole 2 cm. long, armed with two kinds of spines, the shorter ones about 6 mm. long, the longer ones 3.5–5 cm. long; rachis 1.75 cm. long; leaflets 20–25 on each side, lanceolate, acute, the lowest about 17 cm. long and 2.5 cm. wide, the middle ones 32 cm. long and 3.5 cm. wide, aciculate above near the base, the longer spines 3–4 cm. long; cirrhous sparsely long-aciculate, its larger, reflexed spines 3.5–3.8 cm. long; lower spathe almost glabrous, armed at the apex with sparse, appressed spines, the upper spathe fusiform, 22–30 cm. long, 3–4 cm. in diameter, densely armed with spreading, black spines 12 mm. long; peduncle 4–10 cm. long, aciculate; branched portion of the inflorescence 18–20 cm. long, aciculate only at the base, with about 30 simple branches, the longer ones 10 cm. long; staminate calyx 3.3 mm. broad, the petals deltoid, 9 mm. long, acute; pistillate calyx 3 mm. in diameter, annuliform, the corolla cyathiform, 2.5 mm. high; fruit ovoid, 13 mm. long, 11 mm. in diameter.

It is not certain that the two names listed are synonymous. There is some question as to the validity of the various species here recognized, but this can be determined only when a sufficient amount of material is available for study.

**Desmoncus uaxactunensis** Bartlett, Journ. Wash. Acad. Sci. 25: 86. 1935.

Type from Uaxactún, Petén, *Bartlett 12576*. Known only from the original collection.

Stems 5–15 meters long, 4–5 cm. thick (including the sheaths); ocrea of the sheath up to 30 cm. long, furfuraceous-pubescent, armed with black spines 4–18 mm. long; free portion of the petiole 2 cm. long, short-aciculate, the rachis 2.25 meters long; leaflets about 25 on each side, the lowest 25 cm. long and 2 cm. wide, the middle ones 30 cm. long and 4 cm. wide, acuminate, armed above near the base with a few spines 2 cm. long or less; two of the middle leaflets produced into whip-like appendages bearing 9 pairs of retrorse spines 1–6 cm. long, the cirrhous spine-armed only at the apex, the spines about 2 cm. long, or almost suppressed; lower spathe semicylindric, 40 cm. long, 2 cm. broad, brown-lepidote, the upper spathe fusiform, 28 cm. long, 4 cm. thick, furfuraceous-pubescent and densely armed with black spines; free portion of the peduncle 5 cm. long, armed with spines 3–5 mm. long, the branched portion unarmed, 20 cm. long, with 40–50 simple branches 4–12 cm. long; fruit ovoid, 1.5 cm. long, 1.2 cm. in diameter, minutely apiculate.

### ERYTHEA S. Watson

*Reference:* H. E. Moore, Gent. Herb. 8: 215. 1951.

Erect, single-stemmed, medium to tall, hermaphrodite palms, the trunk naked and fibrous-roughened below, clothed with a shag of deciduous leaf sheaths above; leaves palmate, the sheath soft fibrous, unarmed; petiole with margins denticulate to strongly dentate or rarely nearly smooth, a ligule present at the base of the blade above, absent below; leaf blades flabellate to nearly orbicular in outline, very shortly costapalmate, regularly divided to the middle or beyond into numerous 1-nerved segments with bifid apices; inflorescences interfoliar, elongate, with several once- to twice-branched primary divisions, the spathes tubular, sheathing the peduncle and primary branches; flowers small, in groups of 3–2 (–1) on slightly elevated bracteolate cushions, the sepals 3, free and lightly imbricate, petals 3, free or shortly united at the base, valvate, foveolate, stamens 6, the filaments united in a ring at the base and adherent to the corolla, becoming attenuate toward the anthers, carpels 3, glabrous above, tomentose below at least as fruit develops, lightly connate below, the styles connate in a conic beak stigmatic at the apex, ovules solitary, basal, erect; fruit subglobose, mostly 20 mm. long or more with abortive carpels basal, the stigmatic scar subapical, exocarp smooth at maturity, lightly tomentose when young, mesocarp fleshy, endocarp thin and often adherent to the seed; seed with narrow elongate raphe, the endosperm homogeneous with a deep intrusion of the integument below the raphe, embryo lateral.

The genus is composed of about 8 species and is closely allied to *Brahea*. One species is known from Guatemala with possibly a sec-



ond from British Honduras. The latter is not well enough known to be transferred to the genus with certainty and is treated as a doubtful species under the original name, *Paurotis Schippii*.

**Erythea salvadorensis** (Wendl. ex Beccari) H. E. Moore, Gent. Herb. 8: 217. 1951. *Brahea salvadorensis* Wendl. ex Beccari, Webbia 2: 105. 1907. *Acoelorrhaphe salvadorensis* Bartlett, Carnegie Inst. Wash. Publ. 461: 32. 1935. *Acoelorrhaphe Cookii* Bartlett, l.c. *Palma*.

Open dry rocky hillsides, sometimes in *Juniperus* forest, or in oak and pine forest, 800–1600 meters; Baja Verapaz (type of *A. Cookii* collected between Santa Rosa and Salamá, O. F. Cook & C. B. Doyle 275; also between Santa Rosa and Purulhá); Zacapa (Sierra de las Minas; region of Santa Rosalía). El Salvador (the type from Conchagua [“Contshagna”] on the Golfo de Fonseca); Honduras.

A medium-sized palm, sometimes 6 meters high, often acaulescent, frequently forming colonies; leaf sheaths large and thin, glabrous, rufous, breaking up into numerous fibers; petiole elongate, to 4 cm. broad at the base, 2 cm. at the middle, the margins with many acute, incurved teeth, when young furfuraceous-lanate; ligule bilobate, chartaceous, the lobes triangular-attenuate; blades with about 70 plicate divisions on each side, when young floccose-furfuraceous on the nerves, the segments about 85 cm. long and 1–2 cm. wide, the rachis extending into the blade for 12–14 cm.; spadix 1–1.5 meters long or more, the spathes more than 7, the lowest one more than 35 cm. long, opening obliquely at the apex, rather rigid, red, subtending a partial inflorescence more than 70 cm. long; ultimate flowering branchlets slender, 8–18 cm. long, griseous-tomentose; flowers very shortly pedicellate, the pedicels concealed by the calyx, this about 1.5 mm. high, 2 mm. in diameter, sparsely pubescent at the middle and base; corolla 3.5 mm. long, 2 mm. broad, the segments reflexed, dorsally subtomentose or glabrous throughout; pistil glabrous at anthesis but tomentose below and the young fruits densely white-tomentose, more than 1 cm. long.

This is apparently the handsome palm that is so conspicuous on the dry open hillsides of Baja Verapaz (not Alta Verapaz as stated in the original description of *A. Cookii*), growing with oaks, pines, *Juniperus comitana*, and other trees. It commonly forms small isolated colonies, some of which consist only of low plants, 2 meters high or less. The leaves of this palm are much used at the picturesque village of Conchagua in El Salvador for making the jaunty hats peculiar to that settlement.

### EUTERPE Gaertner

*Reference:* Burret, Bot. Jahrb. 63: 49. 1929.

Solitary or cespitose, unarmed, monoecious palms with pinnate leaves and interfoliar or infrafoliar inflorescences subtended by two spathes, the outer short,

ancipitous, and open at the apex, the inner elongate, cylindric in bud with generally a pronounced acute beak; peduncles short or elongate, the branches few to mostly numerous, spreading; flowers in groups of a central pistillate and two lateral staminate, the staminate flowers with imbricate sepals, valvate petals, 6 stamens with elongate filaments straight or geniculate at the apex, and an often trifid pistillode; pistillate flowers sessile or sunken in the axis, the sepals and petals imbricate, staminodes ordinarily present and dentiform, pistil unilocular and uniovulate; fruit usually subglobose with lateral or subapical stigmatic scar, the exocarp smooth or minutely roughened (in drying), mesocarp thinly pulpy with flat fibers, endocarp thin; seed globose with homogeneous or ruminant endosperm, the embryo basal.

About 60 species are known for the genus, which ranges from Guatemala to southern Brazil. In addition to the single species that follows, *Euterpe oleracea* Mart. has been reported vaguely and not at all reliably from British Honduras, where it is surely not native. The palms are said to be known there as "monkey-tail palm" and "mountain cabbage palm."

***Euterpe macrospadix*** Oersted, Vid. Medd. Kjoebenhavn 1858: 41. 1859. *Euterpe leucospadix* Wendl. ex Hemsl. Biol. Centr. Amer., Bot. 3: 401. 1885, name only. *Euterpe panamensis* Burret, Notizbl. Bot. Gart. Berlin 11: 865. 1933. *Plectis Oweniana* O. F. Cook, Bull. Torrey Club 31: 352. 1904; Smithsonian Misc. Coll. 98 (7); 22, pl. 4, 7, 20-26. 1939. *Ternera*; *Halauté* (Quecchi).

Wet or moist, mixed forest, often on limestone, to 1000 meters; Alta Verapaz (type of *Plectis Oweniana* collected from steep slopes and summits of limestone mountains northwest of Panzos near Finca Sepacuite, between Senahú and Cabajón, O. F. Cook & R. F. Griggs 87). British Honduras to Panama.

Trunks smooth, annulate, 25 meters tall or more, about 50 cm. in diameter 1 meter above the thickened base and mass of red-brown exposed or prop roots; leaf sheaths about 1.5 meters long or more forming a distinct crown-shaft, the brown-scaly petiole to about 50 cm. long, 2.7 cm. wide at the apex, the ascending and arching brown-scaly rachis 2.67 meters long or even more, with 60-75 drooping pinnae on each side, the lower ones widely spaced, the remainder more regular and about 4 cm. apart; pinnae linear, the central ones to nearly a meter long, to 4.5 cm. wide, all minutely brown-dotted with membranous scales along the fine nerves below and with conspicuous red-brown larger scales on the prominent midnerve and 2 pairs of rather prominent lateral nerves below; inner spathe densely appressed brown lepidote-tomentose, the peduncle short and stout, the rachis to 40 cm. long with as many as 70 spreading densely white-tomentose branches to 70 cm. long, the lower subtended at first by conspicuous deltoid bracts; staminate flowers about 4.5 mm. long, the sepals 2.5 mm. long, acute, scarious-margined, petals acute, stamens with filaments scarcely geniculate at the apex, pistillode deeply trifid; pistillate flowers sunken in the axis, the fruit inserted in prominent pits, subglobose with subapical stigmatic scar, about 1 cm. in diameter when mature, the seed with homogeneous endosperm.

*Plectis Oweniana* was described as the only species in the genus, but the type, when compared with specimens agreeing with Oersted's description and collected near the type locality, does not seem to be distinct from *Euterpe macrospadix*. The species is apparently rare in Guatemala.

### GEONOMA Willdenow

*Reference:* Burret, Bot. Jahrb. 63: 144. 1930.

Plants slender, low or rather tall, unarmed, the trunk annulate; leaves terminal or alternate, the blades entire, bifid at the apex, or pinnatisect (in the Guatemalan species), the segments acuminate, the sheath tubular, short or elongate; spadices suberect or decurved, simple, furcate, or paniculately branched, slender or stout; spathes 2, usually caducous before anthesis, the lower one incomplete, truncate, concave, the upper compressed or fusiform; flowers small, glumaceous, unisexual, immersed in spirally disposed pits in the branches, in groups of 3-1, the central flower pistillate (or abortive) maturing after the lateral staminate flowers; sepals of the staminate flower slightly imbricate below, the petals valvate, connate below; stamens 6, the filaments connate below into a tube, the anther cells free; pistillate sepals narrow, slightly imbricate below, the petals valvate, connate below; ovary 1-celled, the ovule ascending, the style lateral, long, the 3 stigmas subulate; fruit small, the pericarp usually thin, with slender fibers; endosperm uniform.

One of the largest genera of palms, with about 170 species, widely distributed in tropical America. In Central America, at least, the plants are confined to deep wet primeval forest, and do not establish themselves in secondary forest. Most of them are small, graceful, and handsome plants.

Pits of the spadix branches in which the flowers are inserted more or less bilabiate, the upper margin somewhat produced or conspicuously angulate, the pits spirally or verticillately arranged; lower lip of the pit incised or entire.

Spadix branches slender, the spadix 2-3-branched; pits ternate in alternating whorls. . . . . *G. longepetiolata*

Spadix branches stout.

Spathes narrow, long-tubular, the upper one inserted high above the lower, thin. . . . . *G. polyneura*

Spathes broad, inserted close together, firm and coriaceous. . . . . *G. Seleri*

Pits gradually ascending and graduated into the surface of the branch, not obviously bilabiate.

Pits 8-10 mm. apart; leaf segments 5-11 on each side. . . . . *G. membranacea*

Pits only 3-6 mm. apart.

Leaf segments about 25 pairs, few-nerved. . . . . *G. binervia*

Leaf segments usually 3-7 pairs.

Leaf segments 3 pairs, all of them several-nerved. . . . . *G. mexicana*

Leaf segments 5-7 pairs, partly 1-nerved, partly several-nerved.

*G. leptoclada*

**Geonoma binervia** Oerst. Vid. Medd. Kjoebenhavn 1858: 33.  
1859.



Moist or wet, dense, mixed lowland forest, at or little above (about 150 meters) sea level; Petén; Alta Verapaz; Izabal. Southern Mexico; British Honduras, along the Atlantic coast to Panama.

Plants 3–6 meters high, the trunk 5–7 cm. thick, conspicuously annulate; leaves ascending, unequally pinnatisect, the petiole 30–60 cm. long; the blades as much as 2 meters long; leaf segments about 25 pairs, variable in width, glabrous or sometimes sparsely scurfy on the nerves, 50–60 cm. long, the narrowest ones about 1 cm. wide, the larger ones 7–8 cm. wide or the terminal ones 12 cm. wide or more, narrowly long-attenuate at the apex, obliquely attached and not narrowed below; spadix much branched, the long peduncle subtended at the base by 2 conspicuous erect valves 15–20 cm. long; inflorescences 60–75 cm. long, pendent, diffusely branched, sometimes erect, the ultimate branchlets somewhat pubescent, dark red or maroon, 20–30 cm. long, 2–3 mm. thick, the flowers minute, purplish; staminate flowers about 4 mm. long, usually somewhat exserted at anthesis; pistillate flowers smaller, the 3 stigmas exserted; fruit globose-oblong or globose, 4–6 mm. long, glabrous, brownish black at maturity, or sometimes black and lustrous.

Known in Honduras by the names “manaca” and “pacula.”

***Geonoma leptoclada*** Burret, Notizbl. Bot. Gart. Berlin 11: 863. 1933. *Cum* (Quezaltenango).

Moist or wet, mixed, mountain forest, 1000–2000 meters; so far as known, endemic, but to be expected in Chiapas; Sololá (Volcán de Atitlán); Quezaltenango (type from Volcán de Santa María, at 2000 meters, *F. C. Lehmann 1613*; collected several times on the lower slopes of this volcano).

Plants slender, 1.5–3 meters high, the stems 1.5–2.5 cm. thick, densely annulate; petioles about 30 cm. long, glabrous or glabrate; leaf blades thin, somewhat paler beneath, about 75 cm. long, the rachis brownish-furfuraceous at first, becoming glabrate; leaf blades irregularly pinnatisect, with about 30 primary nerves on each side, the segments several-nerved and 1-nerved, the 2 uppermost broad and falcate, 15–30 cm. long and 6.5–8.5 cm. wide, long-acuminate, 2–3 pairs of the segments several-nerved and 3–4 pairs 1-nerved, all of them conspicuously sigmoid; spadix about 30 cm. long, twice branched, the peduncles about 11 cm. long; scars of the spathes 3 cm. apart; spadix branches densely granulate and white-hirsute, slender, orange, the primary branches about 10, the lowest 2 divided into 2–3 branchlets, the ultimate branchlets 7.5–10 cm. long, not spinose at the apex, the pits spirally arranged, the axis of the branchlets 1–1.5 mm. thick; pits with no upper lip, the lower lip slightly produced but truncate or scarcely rounded, entire; staminate flowers slightly emergent from the pits, whitish; immature fruits subglobose but slightly longer than broad, about 8 mm. long.

***Geonoma longepetiolata*** Oerst. Vid. Medd. Kjoebenhavn 1858: 36. 1859.

Wet, mixed, lowland forest, at or little above sea level; Izabal. British Honduras, along the Atlantic coast to Costa Rica.

Stems 1.5–5 meters high, 2.5 cm. thick or less, the leaf scars 2–3 cm. apart; leaves somewhat brownish-furfuraceous when young but soon glabrate, about 1.5 meters long, the sheath short-cylindric, 15–20 cm. long, the blades with about 30 primary nerves on each side; leaf segments 4–8 on each side, very unequal in width, the lower ones much narrower, 6–12-nerved, the apical ones 10–12-nerved, 40 cm. long or less, sigmoid; spadix twice branched, 40 cm. long or less, the peduncle 6–8 cm. long, the rachis 15–17 cm. long, the 12–14 branches slender; pits arranged in whorls in groups of 3, projecting conspicuously from the axils, the whorls 6–8 mm. apart, the lower lip bifid; fruit globose, 6 mm. in diameter; seed scarcely 5 mm. thick.

Called “monkey-tail palm” in British Honduras; “cah-ca” in Honduras (an Indian name). *G. flaccida* Wendl., reported from Guatemala by Hemsley on the basis of a Skinner collection, is considered a synonym of *G. longepetiolata* by Burret, who does not, however, cite the Skinner collection, which may represent some other species.

***Geonoma membranacea* Wendl. ex Spruce, Journ. Linn. Soc. 11: 106. 1871. *Cum* (San Marcos).**

Moist or wet, mixed, mountain forest, 1300–1500 meters; endemic; Santa Rosa (Cieneguilla); Escuintla (type collected by Wendl. on the western slope of Volcán de Fuego, between San Pedro and Finca Zapote); San Marcos (Volcán de Tajumulco). A photograph of the type is in the Herbarium of Chicago Natural History Museum (Neg. 20793).

Stems slender, 2–4 meters high, 2.5–5 cm. thick, the leaf scars 3–5 cm. apart; leaves about 1.5 meters long, the sheath 10–15 cm. long, closed, the petiole 40–50 cm. long, the blade with 35–40 nerves on each side; segments 5–11 on each side, usually 7–9, unequal, sigmoid, the basal ones 5–7-nerved, 2.5–5 cm. wide, 20–40 cm. long, the succeeding ones 1–3-nerved, the terminal segments 10–12-nerved and 8–11 cm. wide, the segments 2–7 cm. apart; spadix long-pedunculate, 40–50 cm. long, spreading or pendent, the spathes 12–14 cm. long, caducous; rachis of the spadix 9–17 cm. long, the 7–10 slender branches 15–20 cm. long; pits in 5 ranks, 7–10 mm. apart; fruit globose, 7–8 mm. in diameter, the globose seed 5–6 mm. thick.

***Geonoma mexicana* Liebm., ex Mart. Hist. Nat. Palm. 3: 316. 1850. *Pamac*, *Canpamac* (Quechí).**

Moist or wet, mixed forest, 800 meters or lower; reported from Petén; Alta Verapaz; Izabal (Sierra del Mico). Southern Mexico; reported to extend southward to Costa Rica along the Atlantic coast.

Stems usually 1.5–2 meters high and 1–1.5 cm. thick, the leaf scars about 5 cm. apart; leaves rather small, with a very slender petiole and rachis, the segments thin, usually 3 pairs, broad and somewhat sigmoid, several-nerved; spadix 20–30 cm. long, densely pubescent, twice branched, on a short or elongate peduncle, the pits rather dense, only 3–6 mm. apart, the flowers conspicuously emergent; fruits globose, 6 mm. in diameter.

*Tuerckheim* 8332 from Cubilgüitz, Alta Verapaz, which is referable here, was reported from Guatemala as *G. multiflora* Mart., a South American species. Burret used for this species the name *Geonoma oxycarpa* Mart., which is a different species, of Haiti (see L. H. Bailey, *Gentes Herb.* 4: 260. 1939). Lundell has reported from Petén the names "moxán," "cambo," and "uatapil" as in use for a plant referred to this species. In Honduras the young inflorescences of the *Geonomas* sometimes are cooked and eaten like those of *Chamaedorea*. The leaves of various species are often used as thatch, at least for temporary shelters.

***Geonoma polyneura*** Burret, *Notizbl. Bot. Gart. Berlin* 11: 500. 1932.

Moist or wet, mountain forest, 2500 meters or lower; Alta Verapaz (type from Finca Sepacuité, *O. F. Cook & R. F. Griggs* 36); Zacapa (Sierra de las Minas).

Caudex stout, about 3 cm. in diameter; blades apparently large, thin, slightly paler beneath, the segments several-nerved, falcate, narrowly long-acuminate, the terminal segments 10 cm. wide or more, about 40 cm. long, 15-nerved, the middle and lower segments narrower, as much as 55 cm. long, some of them 12-nerved; spadix 40 cm. long or more, twice branched, the branched portion 21–23 cm. long, the rachis 13 cm. long, the spathes robust, 15 cm. long or more, 2.5–3.5 cm. wide, the upper one inserted 2.7 cm. above the lower; primary branches of the spadix 10–11, the lower 2–4 again branched, the branches spreading, at first fuscous-pilose, the ultimate branches 2–2.5 mm. in diameter, not spinose at the tip; pits arranged spirally in about 5 series, 12 mm. apart, bilabiate, the lower lip somewhat protracted, the upper one conspicuously produced; flowers about 3.5 mm. long, large for the genus.

***Geonoma Seleri*** Burret, *Bot. Jahrb.* 63: 211. 1930. *Cum* (Quezaltenango); *Kiang* (San Marcos); *Box* (Huehuetenango); *Pamaca* (Zacapa).

Moist or wet, mixed, mountain forest, 1300–2300 meters, or sometimes lower; endemic; Alta Verapaz (between Sepacuité and Panzós); Zacapa (Sierra de las Minas); Quezaltenango (Volcán de Santa María); San Marcos (Volcán de Tajumulco); Huehuetenango (type from forests of Yalambohoch, *Seler* 2757; also near Maxbal). Figure 44.

Plants 3–9 meters high, the caudex 2.5–7.5 cm. in diameter, conspicuously annulate; leaves large, long-petiolate, the blades unequally pinnatisect, the segments numerous, the terminal ones united with the rachis for 11–13 cm., 11–12-nerved, the lower segments of unequal breadth, mostly 3-nerved, rarely 1-nerved, as much as 55 cm. long; spadix twice branched, recurved, densely brownish-tomentulose at first, glabrate in age; upper spathe inserted 6 cm. above the lower one; peduncles





FIG. 44. *Geonoma Seleri*. a, Basal portion of leaf ( $\times \frac{1}{6}$ ). b, Middle section of leaf ( $\times \frac{1}{6}$ ). c, Apex of leaf ( $\times \frac{1}{6}$ ). d, Portion of spadix ( $\times \frac{2}{3}$ ). e, Young spadix and spathe ( $\times \frac{1}{6}$ ). f, Fruit ( $\times \frac{1}{3}$ ).

about 20 cm. long, the primary branches of the spadix about 13, the lower ones branched, the ultimate branchlets spinose at the apex, as much as 3.5 mm. in diameter near the base; pits spirally arranged, about 5-ranked, 11 mm. apart or sometimes closer together, the upper lip somewhat protracted, the margin acute, the lower lip emarginate; sepals of the staminate flower 4 mm. long, the petals slightly longer than the sepals; pistillate sepals 4 mm. long, ovate-oblong.

## MANICARIA Gaertner

*Reference:* Burret, Notizbl. Bot. Gart. Berlin 11: 389. 1928.

Plants very robust, tall or low, unarmed, the caudex stout, annulate, often curved or flexuous, covered with old leaf sheaths; leaves terminal, very large, sub-erect, lanceolate, acute, plicate-nerved, serrate at first and finally pinnatisect, the costa thick and stout, the petiole slender, the sheath cleft, its margins with many coarse fibers; spadices several, erect-spreading, tomentose, the branches strict, rather thick, foveolate; spathes 2, the upper fusiform, terete, mucronate, fibrous, tardily rupturing; bracts subulate; flowers monoecious, borne in the same spadix, this inserted among the leaves, simply branched, the flowers immersed in pits in the branches, the upper ones staminate, crowded, the lower ones scattered, pistillate; staminate flowers oblong, obtusely trigonous, the sepals ovate-rounded, coriaceous, with scarious margins, imbricate, the petals thick-coriaceous, obovate-oblong, valvate; stamens 24-30, the filaments filiform, connate at the base, the anthers narrowly linear, erect, bifid at the base, emarginate; pistillate flowers larger, ovoid, the perianth little enlarged after anthesis, the sepals rounded, their margins finally lacerate, broadly imbricate, the petals longer, convolute-imbricate at the base, acute and valvate at the apex; ovary sulcate, 3-celled, the stigmas 3, sessile; fruit large, globose, 1-seeded, or depressed-globose and 2-3-seeded, the stigmas terminal, the pericarp corticate, the cortex corky, angulate-echinate, the endocarp vitreous-crustaceous, fibrous within; seeds globose, erect, the hilum oblong, the testa very hard, the branches of the raphe closely reticulate and involving the seed, the endosperm corneous, uniform, the embryo basal.

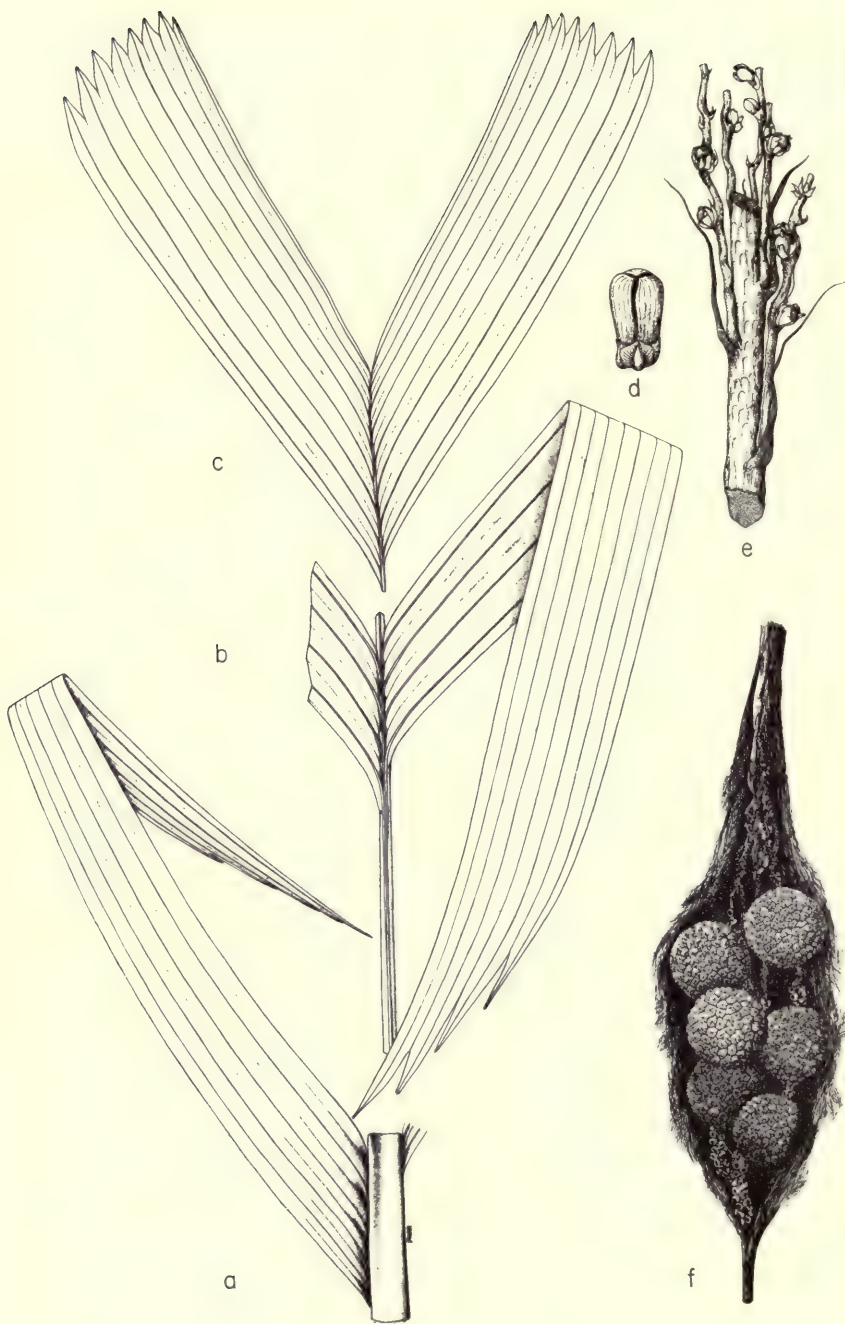
Three species are known, the others Brazilian.

***Manicaria saccifera* Gaertn. Fruct. & Sem. 2: 469. pl. 176. 1791.**  
*Yolillo; Confra; Manaca.* Figure 45.

Abundant in coastal swamps of the north coast, not extending inland beyond the influence of tidewater. British Honduras to Brazil.

Plants sometimes 6 meters high, but usually lower, the trunk usually short or almost none; leaves often 5 meters long; inflorescence about a meter long; fruit 4-5 cm. in diameter, covered with numerous thick, irregularly pyramidal tubercles.

This is the most abundant and conspicuous plant in the extensive tidal swamps along the North Coast, as at Puerto Barrios, where it forms wide dense stands. In Guatemala the trunks usually are short or the plants acaulescent, but sometimes the trunks attain here a height of at least 8 meters. They are much infested with mosses,





*Nephrolepis* (a fern), and other epiphytes. The huge leaves are much used along the Atlantic coast of Central America for thatch, and are said to last longer than those of any other palms. The soft brown feltlike spathes, composed of tough, closely interlaced fibers, form a sort of conic covering for the spadix. They are sometimes used in Panama for making long-peaked caps that are one of the articles sold to tourists there. The plant is called "guágara" in Panama.

### OPSIANDRA O. F. Cook

Plants solitary, the trunk erect, ascending, or flexuous, columnar below, slightly tapering above, scarcely enlarged at the base, supported by a conic mass of very thick roots; leaves usually 5 or 6, ascending, 2-3 meters long, with a cylindric, sheathing base; pinnae numerous, lanceolate, not grouped; inflorescences infraxillary, with numerous tapering, simple branches, or a few of the lower branches furcate near the base; spathes 4, slender, incomplete; flowers alike, in longitudinal rows of 2 or 3, the lowest flower of each group pistillate and somewhat smaller than the staminate ones, a few solitary staminate flowers present near the tips of the branches; sepals orbicular, broadly imbricate; petals broadly triangular, valvate, thick, carinose, persistent; stamens 6, the filaments short and broad; fruit globose-reniform, with a distinct groove on the median face above the stigma, smooth, the pericarp carinose; seed depressed or subreniform, almost smooth, slightly impressed with 5-7 simple or sparsely branched fibers radiating from the inner side of the hilum, the endosperm uniform, the embryo about intermediate between basal and lateral.

The genus consists of a single species. It is related to *Synechanthus* but differs in the much greater size of the plant, the pinnae regularly arranged but in different planes from the rachis, the stout rather than slender spadix branches, and the valvate rather than imbricate petals of the pistillate flowers. Some of the West Indian species of *Gaussia* are somewhat similar in habit.

**Opsiandra maya** O. F. Cook, Journ. Wash. Acad. Sci. 13: 182. 1923. *Palma cimarrona*; *Cambo*.

Known only from the forests of northern Petén, at 150 meters or lower, and in adjacent British Honduras; type from Laguna Colorado, Tikal District, Cook & Martin 94.

Trunk 20 meters tall or more, about 15 cm. in diameter near the base, the internodes 12-15 cm. long, becoming shorter above; leaves 2-3 meters long, the sheath-

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FIG. 45. *Manicaria saccifera*. a, Portion of leaf near base ( $\times \frac{1}{8}$ ). b, Portion of leaf near middle ( $\times \frac{1}{8}$ ). c, Apex of leaf ( $\times \frac{1}{8}$ ). d, Staminate flower ( $\times 2$ ). e, Portion of inflorescence, showing female flowers near base and male near apex ( $\times \frac{1}{2}$ ). f, Fruiting spathe opened to show fruits in position ( $\times \frac{1}{8}$ ).

ing portion 30 cm. long, the petiole 65 cm. long, 3 cm. thick above; pinnae about 88 pairs, the lowest 41 cm. long and 2.2 cm. wide, the largest ones, somewhat below the middle, 61 cm. long and 3.8 cm. wide, one nerve on each side of the costa more prominent than the others; inflorescence 75 cm. long, the branched portion 34 cm. long, the branches 17–18, 30 cm. long or less, 4–5 mm. thick; spathes 4, the lowest 9.5 cm. long, 5.5 cm. wide, distinctly carinate on each side, the uppermost 19 cm. long and 2 cm. wide; sepals 1 mm. long, the pistillate petals in anthesis 2 mm. long, slightly accrescent; fruit 1–1.5 cm. in diameter, with a soft, red, fleshy pericarp, the flesh mucilaginous and very sticky; seeds about 1 cm. in diameter.

## ORBIGNYA Martius

*Reference:* M. Burret, Notizbl. Bot. Gart. Berlin 10: 498. 1929.

Low or tall, unarmed palms, the trunk solitary, with irregular scars; leaves terminal, pinnatisect, the segments alternate, linear-lanceolate, acuminate, the margins recurved at the base, the sheath open; spadices large, the rachis thick, the branches short, alternate, erect, the pistillate thicker than the staminate ones; spathes several, fusiform; bracts and bractlets membranaceous, connate; staminate flowers small, the sepals minute, ovate-triangular, the petals 3, ovate or ovate-lanceolate, entire or dentate, free or connate at the base, valvate; stamens 12–14, the filaments filiform, the anthers linear, spirally twisted; pistillate flowers large, subglobose or trigonous-ovoid, the perianth accrescent after anthesis, the sepals thick-coriaceous, ovate or oblong-lanceolate, imbricate, the petals similar but smaller, convolute-imbricate, acute, sometimes dentate; ovary ovoid, 2–7-celled, the style short and thick, with 2–7 large, erect stigmas, the ovules basal, erect; fruit large, globose or ovoid, rostrate, 2–6-seeded, the style terminal, the pericarp fibrous, the endocarp osseous, fibrous outside, 3–6-pored near the base; seeds narrow, oblong or obovoid, the testa reticulate by the branches of the raphe, the endosperm uniform, cartilaginous, the embryo opposite one of the pores.

A genus of about 20 species, the others South American.

**Orbignya Cohune** (Mart.) Dahlgren ex Standl. Trop. Woods 30: 3. 1932. *Attalea Cohune* Mart. Hist. Nat. Palm. 3: 300. *pl.* 167. 1836–50. *Manaca*; *Corozo*; *Cohune*; *Tutz* (Maya); *Corós* (Quecchí).

Abundant at many places in the Atlantic lowlands, growing mostly on rather well-drained land, on plains or often on mountain sides, chiefly at 300 meters or lower; Petén; Alta Verapaz; Izabal. Southern Mexico; British Honduras to Honduras, and perhaps extending as far south as Costa Rica. Figure 46.

Plants very large, often low and acaulescent or with a short trunk, the trunks of mature trees 9–15 meters tall, thick, usually bearing persistent leaf bases above; leaves numerous, plume-like and graceful in spite of their great size, sometimes 10 meters long and 2 meters wide, recurving, with numerous, elongate, very narrow segments; staminate inflorescences commonly 1–1.5 meters long, with numerous flowers; fruiting panicles very large and heavy, pendent, containing often 800–1000 fruits; fruits about 6 cm. long, resembling small coconuts.

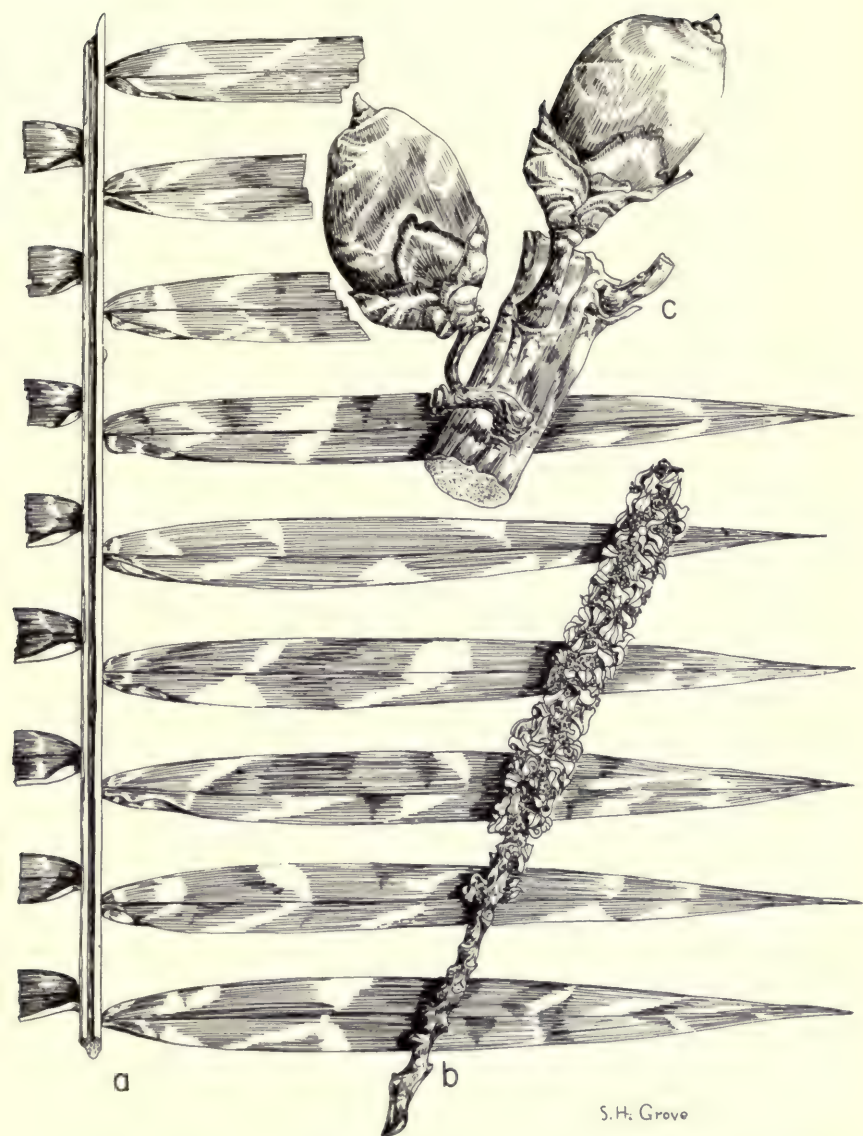


FIG. 46. *Orbignya Cohune*. a, Section of leaf ( $\times \frac{1}{5}$ ). b, Portion of staminate spadix ( $\times \frac{2}{5}$ ). c, Portion of fruiting branch ( $\times \frac{2}{5}$ ).



The names "corozo" and "manaca" are used commonly for this palm in Guatemala, and the term "manaca shack" is given commonly by the English-speaking people of the coast to the dwellings made from the leaves. A *caserío* of Izabal has received very appropriately the name "Manaca."

This is by far the largest and most majestic of all the palms of Central America. It is abundant in many places along and near the Atlantic coast, often forming stands of wide extent. It is naturally a forest palm, forming a dense undergrowth in primeval mountain forest, but if the shade is removed the plants seem to thrive equally well, and they are seen everywhere in their native regions in open places. Morris, who gave considerable attention to this and other palms in British Honduras, estimated one leaf he saw to have a length of 18 meters and a breadth of 2.5 meters, and lengths of 10–12 meters are not uncommon. The plant thus produces probably the largest leaves of any American plant. Brigham, who studied this and other Guatemalan plants many years ago, estimated the number of staminate flowers in an inflorescence at more than 30,000. These flowers attract many bees and wasps. He maintained that the plant was called "manaca" when acaulescent, and "corozo" when having a well-developed trunk, but this is questionable.

In Guatemala the corozo often is associated with *Pinus caribaea*. It is the most conspicuous palm along the railway leaving Puerto Barrios, all the way inland until the dense forest terminates shortly before the road reaches Gualán. On the North Coast of Guatemala this palm is used in constructing dwellings, a very great part of them being made almost wholly of the materials it supplies. The stout midribs of the leaves form the framework, while the leaves, placed crosswise so that their segments form a dense thatch, constitute the roofs. Such buildings are substantial and durable. The young leaves are utilized for making hats. Segments of the large leaves are used by the Indians of Alta Verapaz for making the *suyacales*—large mats that protect their clothing and loads from the rains. During the rainy season an Indian with a rolled-up *suyacal* (if it is not raining) is almost as characteristic of Alta Verapaz as the Britisher with his rolled umbrella is of England.

Throughout its range, a kind of wine sometimes is made from the sap of the corozo. A cavity about 30 cm. square is cut in the cabbage, screened in various manners, and left for about a week, during which time the sap collects and ferments.

The part of the corozo having the greatest possibilities is the seeds. These are rich in oil, which is in demand for making soap and

for other purposes. The only obstacle to the development of an important corozo industry is the hardness of the nuts, which are difficult to crush. In recent years an industry of considerable importance has been developed in British Honduras, in cultivating the plants and extracting oil from the seeds, and special machinery is now used for their treatment. During the first world war the seeds were used in preparation of charcoal for gas masks. The nuts are produced in great abundance, as indicated in the description above, and a single fruiting panicle sometimes weighs more than 100 pounds.

### PAUROTIS O. F. Cook

*References:* Beccari, Webbia 2: 107. 1907; H. H. Bartlett, Carnegie Inst. Wash. Publ. 461: 31-34. 1935; Bailey, Gent. Herb. 4: 361. 1940; H. E. Moore, Gent. Herb. 8: 210. 1951.

Erect, caespitose, slender, medium-sized hermaphrodite palms, the trunk clothed with persistent leaf sheaths or in age naked below; leaves palmate, the sheath soft fibrous, unarmed; petioles armed with stoutish teeth along the margins, ligule present at base of the blade above, absent below; inflorescences interfoliar, erect-slender, with several twice-branched divisions, the tubular spathes sheathing the peduncle and primary branches; flowers small, in clusters of 3-2 (-1) on slightly elevated bracteolate cushions, the calyx of 3 nearly free sepals about half as long as the 3 essentially free, valvate, foveolate petals, stamens 6 with filaments united in a ring below, attenuate above to the anthers; carpels 3, lightly connate below, the styles short, connate in a conic beak and stigmatic at the apex, the ovule basal and erect; fruit globose or ovoid-globose, small, with smooth exocarp, slightly fleshy mesocarp, and thin, fragile endocarp; seed globose with a short raphe half as long as the seed, the endosperm homogeneous without intruded integument, embryo lateral.

The genus consists of a single species and by most recent authors has been treated under the generic name *Acoelorrhaphe* Wendland. For comments on the correct name see Bailey and Moore listed above.

**Paurotis Wrightii** (Griseb. & Wendl.) Britton ex Britton & Schafer, N. Amer. Trees 141. 1908. *Copernicia Wrightii* Griseb. & Wendl. ex Griseb. Cat. Pl. Cuba 220. 1866. *Acoelorrhaphe Wrightii* Beccari, Webbia 2: 109. 1907. *Brahea psilocalyx* Burret, Notizbl. Bot. Gart. Berlin 11: 1037. 1934 (type from Manatee Lagoon, British Honduras, *M. E. Peck* 241). *A. pinetorum* Bartlett, Carnegie Inst. Wash. Publ. 461: 33. 1935 (type from pine woods near Belize, British Honduras, *H. H. Bartlett* 11201). *Palma*. Figure 47.

Moist or wet pine woods, sometimes in *Manicaria* swamps, or about or in savannas, 200 meters or lower; Alta Verapaz; Izabal;

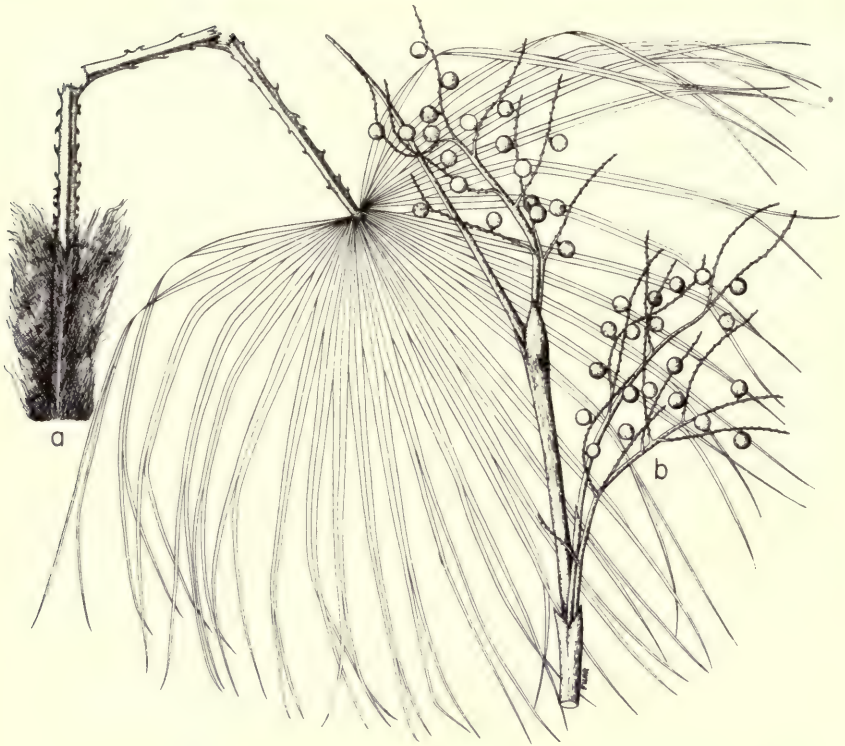


FIG. 47. *Paurotis Wrightii*. a, Leaf ( $\times \frac{1}{14}$ ). b, Portion of fruiting branch ( $\times \frac{1}{4}$ ).

probably also in Petén. Southern Mexico to Honduras; Cuba; southern Florida.

A rather small palm, the trunk slender, 3–8 meters high, 6–10 cm. in diameter, the plants usually forming colonies; leaf sheaths rufous-brown, glabrous, lustrous, dividing into numerous fibers; petioles 125 cm. long or shorter, usually coarsely dentate on the margins with brown incurved teeth; leaf blades grass-green above, dull pale green or silvery beneath, orbicular in outline, with about 40 segments on each side, almost glabrous or minutely whitish-pubescent; inflorescences ascending to erect, the spadix about a meter long, with about 9 spathes, the lowest spathe reddish, semicylindric, about 14 cm. long, glabrate, but when young floccose-pilose, especially on the margins; primary branches of the spadix 25 cm. long or less, the branchlets white-tomentose, only the ultimate ones floriferous, 5–12 cm. long; calyx segments pale brown, 1 mm. long, carnosae, free and membranaceous at the apex, multifimbriate; corolla pale brown when dry, white-lineate, the petals fleshy, glabrous, 1.7 mm. long; fruit 7–8 mm. long and 6–8 mm. in diameter.

In British Honduras called “Honduras pimenta” and “Hairy Tom palmetto.” No good reasons have been given for separating the Brit-



ish Honduras palm from that of Cuba and Florida. Bartlett says that *Acoelorrhaphe pinetorum* differs from *A. Wrightii* "in a number of minute but definite floral characteristics that are sufficient to give it specific status," but these must be minute indeed, since he gives no hint of what they may be. Apparently the British Honduras palm's chief claim to recognition as a separate species is its range; but range, despite its frequent invocation, is not a specific character.

#### DOUBTFUL SPECIES

*Paurotis Schippii* Burret, Notizbl. Bot. Gart. Berlin 12: 303. 1935.  
*Brahea Schippii* Burret, op. cit. 304, nomen. *Acoelorrhaphe Schippii* Dahlgren, Field Mus. Bot. 14: 9. 1936.

Type from swamp forest, Pojktuun trail, British Honduras, at 780 meters, *W. A. Schipp S893*.

Plants as much as 6 meters high, the trunks solitary, 15–20 cm. in diameter; free portion of the petiole 70 cm. long, 1.5 cm. broad at the base, the margins completely unarmed; ligule triangular, conspicuously produced, densely lanuginous-tomentose with rather long, fuscous hairs; blade 60 cm. in greatest length, white-ceraceous beneath, with about 60 segments, these only 24–28 cm. long, the rachis about 12.5 cm. long; spadix 2.5 meters long, the peduncle 1.7 meters long; spathes 6, narrowly tubular, glabrous, striate-nerved, the lowest 36 cm. long; branched portion of the inflorescence 78 cm. long, the branches closely and very densely fuscous-tomentose, the ultimate floriferous branchlets filiform, 5–11 cm. long, the flowers glabrous; sepals ovate, the petals elliptic-oblong; ovary glabrous; fruit unknown.

Although placed in *Paurotis* by Burret, this species has much more affinity with *Erythea*. Until mature fruit is known, its disposition must remain in question.

#### PHOENIX L. Date

Plants unarmed, the trunk usually thick and elongate, sometimes short, often cespitose, covered above by the persistent leaf bases; leaves terminal, spreading-recurved, unequally pinnate, the segments grouped or almost equally spaced, elongate-lanceolate or ensiform, acuminate, stiff; spadices usually several, erect or in fruit pendent, the peduncle strongly compressed; spathe complete, elongate, compressed and 2-edged, coriaceous, cleft ventrally; flowers small, dioecious, sessile along the fastigiate branchlets, minutely bracteate, ebracteolate, the perianth coriaceous; staminate flowers oblong or ovoid, the calyx cupular, tridentate, the 3 petals obliquely oblong or ovate, subconnate at the base, valvate; stamens 6, the subulate filaments connate at the base, the anthers linear-oblong, erect, dorsifixed; pistillate flowers as large as the staminate, globose, the perianth accrescent after anthesis, the 3 petals rounded, concave, broadly imbricate; ovary 3-carpellate, the carpels distinct, ovoid or globose, the stigmas sessile, uncinat, the ovules erect;

fruit oblong, terete, 1-seeded, the stigmas terminal, the pericarp fleshy, the endocarp thin-membranaceous; seed erect, linear-oblong, deeply sulcate ventrally, the hilum basal, the endosperm corneous, the embryo dorsal or subbasal.

About a dozen species, in tropical and subtropical Asia and Africa, one of them of great importance for its edible fruit and grown for this reason in remote parts of the earth.

**Phoenix dactylifera** L. Sp. Pl. 1188. 1753. *Datilero* (tree). *Datil* (fruit).

Native of northern Africa but often grown in other parts of the earth; planted in Guatemala infrequently, for ornament or as a curiosity, but little planted anywhere in Central America.

Although there are occasional date trees in many parts of Central America, most of them never produce fruits; it is not certain that any of them ever do. In desert areas of northwestern Mexico, and in southern Arizona and California, the trees thrive and fruits are produced freely. A date industry of importance is now well established in the United States. Regions of similar climate are found in Guatemala, particularly in the Motagua Valley and about Huehuetenango, and there is no apparent reason why dates should not be produced there, if proper treatment were given to ensure fertilization. The date palm was imported to Mexico by the Spaniards probably soon after the Conquest. In Guatemala we have observed date trees of thrifty appearance in Guatemala, Almolonga, Huehuetenango, Cobán, and elsewhere.

*Phoenix canariensis* Hort., a very common ornamental palm of Florida, believed to come from the Canary Islands, is planted frequently for ornament in Guatemalan gardens, especially in the central departments. It is somewhat similar to the date palm but much more slender in all its parts.

### REINHARDTIA Liebmann

*References:* M. Burret, Die Palmengattungen *Reinhardtia* Liebm. und *Malortia* H. Wendl. Notizbl. Bot. Gart. Berlin 11: 551-556. 1932; H. E. Moore, *Reinhardtia*, Gentes Herb. 8: 541-576. 1957.

Plants small and low, sometimes nearly acaulescent, unarmed, slender, the stems covered by the leaf sheaths; leaves pinnate or simple and bifid at the apex, the broad terminal segments of some species several-nerved with elongate perforations or "windows" along the costa; spadices inserted between the leaves, long-pedunculate, erect, the branches few, strict, stiff, simple or the lower sometimes again branched, compressed-angulate, bracteate at the base; spathes 2, much

shorter than the peduncle, membranaceous or coriaceous, compressed and bicarinate, the flower clusters rather remote; flowers unisexual, borne on the same spadix, ternate on the branches, the middle flower pistillate; staminate flowers slightly asymmetric, conic-ovoid, the sepals orbicular, concave, imbricate; petals ovate or lanceolate, acute, rigid, valvate; stamens 8–40, the filaments short, the anthers linear, basifixed or dorsifixed; pistillate flowers smaller, ovoid, accrescent after anthesis, the sepals orbicular, imbricate, petals exceeding the sepals, valvate above a slightly imbricate or connate base, staminodes present and variously adnate to the petals, the pistil trilocular, triovulate, with only one ovule usually developing; fruit small, ovoid or ellipsoid, apiculate, with terminal stigmatic scars, 1-celled and 1-seeded; seed ellipsoid, erect, the attachment basal or lateral, the endosperm homogeneous or ruminant.

The genus consists of five species, mostly Central American but extending into southern Mexico and Colombia. *R. Koschnyana* (Wendl. & Dammer) Burret of Costa Rica to Colombia is one of the smallest palms known.

Seeds with deeply ruminant endosperm; stamens 27–40; petiole not pale or wing-margined below, densely and persistently marked with brown scales.

*R. latisecta*

Seeds with essentially homogeneous endosperm; stamens 8–22; petiole pale and narrowly winged along the margin below with deciduous scales . . . *R. gracilis*

***Reinhardtia gracilis*** (Wendl.) Burret, Notizbl. Bot. Gart. Berlin 11: 554. 1932. *Malortiea gracilis* Wendl. in Otto & Dietr. Allg. Gartenz. 21: 26, 146. 1853. Figure 48.

Stems cane-like, solitary or cespitose in dense to loose clumps, to 2.45 meters high and 1.4 cm. in diameter; sheaths 6–15 cm. long; petiole elongate, pale and narrowly wing-margined below with deciduous scales, the rachis 3.5–23 cm. long with 2 or rarely 3–4 pinnae on each side, these with narrowly elongate perforations or "windows" along the rachis between most of the 8–22 pairs of nerves, the terminal pinnae largest, with 5–16 nerves, 7.5–23 cm. long on the upper margin, the outer margin coarsely dentate, the lower pair or pairs of pinnae narrowly cuneate and mostly 3–7-nerved, 8.5–25 cm. long, 2.8–15 cm. wide, coarsely dentate on the lower margin; inflorescence long-pedunculate, with 2–11 or more mostly simple branches 2.5–29 cm. long, becoming dark red or purplish in fruit, the staminate flowers 3–6 mm. long with 8–22 stamens; fruit 12–16 mm. long, 6–8 mm. in diameter when dry, black at maturity, capped with a low to prominent umbo; seed basally attached, the endosperm homogeneous or with minute marginal intrusions.

According to Moore, this species consists of four varieties, distributed from southern Mexico to Costa Rica. Two of these varieties are known to occur in Guatemala, *R. gracilis* var. *gracilis*, the typical variety, and *R. gracilis* var. *gracilior*. The latter is distinguished from var. *gracilis* in having 8–10 instead of 16–22 stamens, and in having staminate flowers 3–4 mm. instead of 5–6 mm. long when mature.





FIG. 48. *Reinhardtia gracilis*. a, Habit of upper portion of fruiting plant ( $\times \frac{2}{5}$ ). b, Fruit ( $\times 3$ ).

**Reinhardtia gracilis** var. **gracilis**

Dense wet forests, at or little above sea level to 520 meters; Izabal; described from cultivated plants of Guatemalan origin; British Honduras (Pueblo Viejo, *Schipp S-523*); Honduras.

Stems 1–2.4 meters high; leaves large with 14–22 nerves on each side of a rachis 11–23 cm. long, the lower pinnae 4–7-nerved, 14.5–25 cm. long, 3–6.5 cm. wide; inflorescence with 6–11 branches, the lower often forked or branched, 7–29 cm. long, flowering nodes 16–40, the staminate flowers 5–6 mm. long with 17–22 stamens; fruit 14–16 mm. long with a low crown at maturity.

**Reinhardtia gracilis** var. **gracilior** (Burret) H. E. Moore, *Principes* 1: 140, 145. 1957. *Reinhardtia gracilior* Burret, *Notizbl. Bot. Gart. Berlin* 11: 555. 1932.

Moist or wet forest, at or little above sea level; British Honduras, the type from Stann Creek Valley, *W. A. Schipp 8369*; to be expected in Petén and Izabal. Southern Mexico; Honduras.

Stems to 1 meter high; leaves small with 8–11 nerves on each side of a rachis 3.5–6 cm. long, the lower pinnae 3–4-nerved, 8.5–12 cm. long, 1.8–3.2 cm. wide; inflorescence with 3–6 simple branches 2.5–8.5 cm. long, the flowering nodes 6–17, staminate flowers 3–3.5 mm. long with 8–10 stamens; fruit 12–14 mm. long with a low crown.

**Reinhardtia latisecta** (Wendl.) Burret, *Notizbl. Bot. Gart. Berlin* 11: 554. 1932. *Malortiea latisecta* Wendl. in Otto & Dietr. *Allg. Gartenz.* 21: 146. 1853.

Originally described from plants of Guatemalan origin, collected by Kegel; not collected recently in the country but to be expected in Izabal or the lowlands of Alta Verapaz. British Honduras (Middlesex, *W. A. Schipp S-56*; Stann Creek Valley, *Schipp 8370*; Río Grande, *Schipp S-370*).

Plants tall, as much as 8 meters high, caespitose in clumps of 8–9 stems, these to 6.5 cm. in diameter; leaves about 10, long-petiolate, the petiole densely and persistently brown-scaly and not wing-margined, the 2–3 broad 1–several-nerved pinnae to 62.5 cm. long, 11.5 cm. wide or more, with elongate apertures between many of the 21–24 nerves along the rachis, the upper pinnae broadest and 14–15-nerved; all the pinnae coarsely dentate along the outer margin; inflorescence exceeding the leaves, with 15–19 branches to 20 cm. long or more, becoming red in fruit; staminate flowers with 22–27 stamens; fruit black at maturity, ellipsoid or obovoid, about 17 mm. long, 11 mm. in diameter; seed laterally attached with deeply ruminate endosperm.

*Rhapis humilis* Blume, probably a native of China, is cultivated rarely in Guatemala for ornament. It is a handsome dwarf palm,

generally 2 meters high or less, forming dense clumps of stems. The slender stems are green, reedlike, and unarmed; the small leaves are fan-shaped and 20 cm. long or shorter.

### ROYSTONEA O. F. Cook

Tall, unarmed palms, the caudex solitary, more or less swollen at or above the middle, green above and almost smooth; leaves terminal, large, equally pinnatisect, the numerous segments narrowly linear-lanceolate, narrowed at the apex and unequally bifid, paleaceous beneath, the sheath elongate; spadix large, the branches elongate, slender, pendulous; spathes 2, complete, the lower semicylindric, equaling the spadix, the upper ensiform, ventrally cleft; bracts and bractlets scale-like; flowers small, white, monoecious in the same spadix, arranged in lax spirals, the lower flowers ternate, the middle one staminate, the upper flowers solitary or binate, staminate, the spadices arising below the leaves; staminate sepals minute, broadly ovate, scarious, imbricate at the base, the petals subequal, ovate, acute, connate at the base, thin-coriaceous, valvate; stamens 6, 9, or 12, exserted, the filaments short, broadly subulate, united at the base with the petals, the anthers large, ovate-sagittate, dorsifixed, versatile; pistillate flowers smaller than the staminate, the perianth scarcely enlarged after anthesis, the sepals ovate-rounded or reniform-rounded, broadly imbricate, the corolla urceolate, trilobate to the middle, the triangular lobes acute, valvate; ovary subglobose, gibbous at the base, 2-celled, the stigmas thick, sessile, the ovule parietal, ascending; fruit small, obovoid or oblong-obovoid, curved, 1-celled, the stigmas subbasal, the pericarp fleshy and fibrous, the endocarp thin; seed oblong-reniform, the testa adnate to the endocarp, the hilum rather broad, ventral, the branches of the raphe radiating from the hilum and reticulate, the endosperm uniform, the embryo subbasal.

Six species are now recognized, ranging from southern Florida through the West Indies to northern South America, and along the northern Atlantic coast of Central America. The name *Oreodoxa* usually has been employed for this genus, but it has been found to apply properly to a South American palm of different relationship.

Fruit obovoid-oblong, longer than broad; leaf sheaths not lepidote; leaves horizontal..... *R. oleracea*

Fruit ovoid, about as broad as long; leaf sheaths brown-lepidote; leaves somewhat drooping..... *R. regia*

**Roystonea oleracea** (Jacq.) O. F. Cook, Bull. Torrey Club 28: 554. 1901. *Areca oleracea* Jacq. Sel. Stirp. Amer. 1: 278. *pl.* 170. 1763. *Oreodoxa oleracea* Mart. Hist. Nat. Palm. 3: 166. *pl.* 156, 163. 1837.

Not seen wild by the writers in Guatemala but to be expected there; it or a closely related species is found wild in the lowlands of Honduras and British Honduras and is certainly to be expected on the North Coast of Guatemala. West Indies.



Plants very tall, sometimes 40 meters high, the trunk slender, somewhat enlarged at the base, sometimes also at or above the middle but in age becoming more uniform, pale; leaves 3–7 meters long and 2 meters wide, the pinnae 100 or more, closely set, as much as 5 cm. wide, in a single row on each side of the rachis; inflorescences very large and pendent, twice branched, the branches somewhat undulate; fruits oblong and usually somewhat curved, 1.5–2 cm. long, 1 cm. thick, purplish to black.

Called “yagua” in Honduras.

**Roystonea regia** (HBK.) O. F. Cook, *Science* II. 12: 479. 1900.  
*Oreodoxa regia* HBK. *Nov. Gen. & Sp.* 1: 244. 1815. *Palma real*.  
*Royal Palm*.

Native of Cuba; now grown for ornament in most parts of tropical America; planted abundantly in Guatemala, especially in parks.

A tall palm, sometimes 25 meters high but generally lower, the trunk swollen at or near the middle and commonly also near the base; leaves shorter than in the preceding species, the pinnae evidently in 2 rows on each side of the rachis, 3–4 cm. wide; branches of the spadix not undulate; fruit elongate-globose or almost globose, somewhat narrowed at the base, 8–13 mm. long, about 10 mm. broad, reddish brown or purplish at maturity.

This is the most highly esteemed of the cultivated ornamental palms of Guatemala. It is planted freely in many of the parks, from the capital down to the coasts, also in gardens and *fincas*. It is much more common than *R. oleracea*. Some of the driveways leading into the coffee *fincas* of the Pacific *boca costa* are bordered by handsome avenues of royal palms. Trees of what appear to be both the species listed here may sometimes be seen in the same avenue.

### SABAL Adanson

*References:* Beccari, *Webbia* 2: 10. 1907; H. H. Bartlett, *Carnegie Inst. Wash. Publ.* 461: 35. 1935; L. H. Bailey, *American palmettoes*, *Gentes Herb.* 3: 274–339. *f. 145–190.* 1934; Revision of the American palmettoes, *Gentes Herb.* 6: 366–459. *f. 186–459.* 1944.

Plants tall or low, unarmed, the trunk usually thick, annulate, covered above by remains of the leaf sheaths; leaves terminal, orbicular, fan-shaped, flabellately multifid, the segments linear, bifid, often with threadlike fibers along the margins, the rachis short or elongate, the ligule short, adnate to the rachis, the sheath short; flowers perfect, the spadices large, branched, at first erect, the slender branches decurved or pendulous; spathes long-sheathing, tubular, the opening oblique, the bracts and bractlets minute, the flowers small, glabrous, solitary and sessile along the branches, the perianth not changed after anthesis; calyx cupular, unequally tridentate, truncate at the base; corolla deeply trilobate, the lobes ovate-oblong, acute, concave, the margins imbricate below the valvate apices; stamens 6, the

filaments subulate, dilated at the base and connate with the corolla tube to form an annulus, the anthers ovate-cordate, dorsifixed; ovary trigonous, 3-celled, attenuate to a columnar style, the stigma truncate, the ovules basal, erect; fruit small or medium-sized, usually of a single 1-seeded carpel, the style basal, the pericarp fleshy, separating from the membranaceous epicarp; seed erect, depressed-globose, the small hilum basal, the endosperm undivided, the embryo dorsal.

About 25 species, ranging from southern United States and Mexico to West Indies and Venezuela. No other species are known from Central America.

Ligule of the leaf very small and narrow or sharp-pointed, usually not more than 2-3 cm. long. . . . . *S. mayarum*

Ligule of the leaf elongate or broad or large, 4-5 cm. long or larger.

Fruits 13-20 mm. broad, 15 mm. long; undivided basal portion of the leaf one-third to one-fourth the length of the blade. . . . . *S. mexicana*

Fruits 8-10 mm. broad, 10-13 mm. long; undivided portion of the leaf very short, sometimes almost none.

Branchlets (rachillae) of the inflorescence very slender, 1 mm. thick or less when dry, the ends almost filiform. . . . . *S. nematoclada*

Branchlets relatively stout, not filiform, more than 1 mm. thick when dry. . . . . *S. Morrisiana*

**Sabal mayarum** Bartlett, Carnegie Inst. Wash. Publ. 461: 35. 1935.

British Honduras, at or little above sea level; type from Maskall, Belize District, *P. E. Gentle 1156*; also in Corozal District; to be expected in Petén.

Plants rather small, 4 meters high; leaves about 2 meters wide, light green but not glaucous, somewhat paler beneath, cleft nearly to the base into many narrow segments, the basal undivided portion 15-20 cm. long or shorter; petioles about 2 cm. broad at the apex, continued into the blade for 60 cm. as a rachis or costa; ligule very short, triangular, acute or acuminate, 2-3 cm. long; spadix 1 meter long or more, much branched, the sheaths finely striate, the branchlets 3-6 cm. long, slender, sharply angulate when dry; flowers 3-4 mm. long, contiguous but not congested on the rachilla, subtended by 3 unequal bractlets; calyx 1.5 mm. high, not costate, the 3 lobes obtuse, spreading; petals flat, open at anthesis, the corolla 4-5 mm. broad when dry; fruit unknown.

The species was reported by Bartlett from Yucatan and Cuba but according to Bailey, the collections so reported belong to other species not found in either Guatemala or British Honduras. Known in British Honduras by the names "botan," "huano," "bayleaf palm," and "big thatch."

**Sabal mexicana** Martius, Hist. Nat. Palm. 3: 246. 1838. ?*S. guatemalensis* Beccari, Webbia 2: 68. 1907 (type collected in Guatemala by Skinner, the locality unknown).

Open, rather dry hillsides, or on coastal plains or in river valleys, sometimes along the borders of mangrove or bamboo swamps, 1400 meters or lower; reported from Petén, perhaps in error; El Progreso; Zacapa; Chiquimula; Escuintla; Retalhuleu; San Marcos; Huehuetenango(?); probably in all the Pacific coast departments. Widely distributed in Mexico. Figure 49.

Younger plants often large but acaulescent, the older ones with a trunk 10–12 meters high terminating in a crown of large and handsome leaves, often fruiting when acaulescent or nearly so; trunk coarsely ringed with separate steplike protuberances, often bearing below the leaves projecting old petioles; leaf blades about a meter long and broad, or sometimes smaller, the main segments 4–6 cm. wide; petioles slender, equaling or exceeding the blade, the ligule 10–13 cm. long; inflorescences equaling or slightly exceeding the leaves; branchlets glabrous, slender, 12 cm. long or shorter, closely flowered; flowers almost white, fragrant, 3–4 mm. long, with spreading petals; calyx cupular, notched, somewhat costulate; petals narrowly oblong, acute, nerved, longer than the calyx and equaling the anthers; fruits often very numerous and crowded, irregularly rounded-oblate, flattened at the base, 13–20 mm. broad, 15 mm. high; seed flat at the base, convex on the upper surface, chocolate-brown, 9 mm. in diameter; micropyle centrally lateral.

This palm is conspicuous along the Motagua Valley in El Progreso and Zacapa, usually growing in the shallow stream beds and forming large groves. It is abundant at many places along the Pacific plains, sometimes forming very large groves or forests of widely or closely spaced trees, and forming a conspicuous feature of the landscape. It grows there also in cattle pastures and in remnants of former woodlands. The tree is often planted for ornament in Guatemala, and sometimes probably for its leaves, which are used as thatch and for the innumerable purposes for which palm leaves are utilized in Guatemala. Lundell states that the palm is planted in Petén, and the leaves used there for making hats, its Petén name being “guano” or “huano de sombrero.” In the Motagua Valley and in Chiquimula the leaves are much used for thatch, and also overlapped to make the sides of huts, which in that torrid region need not be very substantial. Palms probably of this species were observed in cultivation in Puerto Barrios. Bailey considered *Sabal guatemalensis* a name of questionable identity, but suggested that it may be synonymous with *S. mexicana*. This seems probable, since it is improbable that any *Sabal* distinct from that occurs in any part of Guatemala through which Skinner traveled, all the areas known to him probably having been covered by our own collecting trips.

**Sabal Morrisiana** Bartlett, Carnegie Inst. Wash. Publ. 461: 22, f. 1, pl. 3, 6. 1935, without description; L. H. Bailey, Gentes Herb. 6: 412. f. 217, 218. 1944. *Botán.*



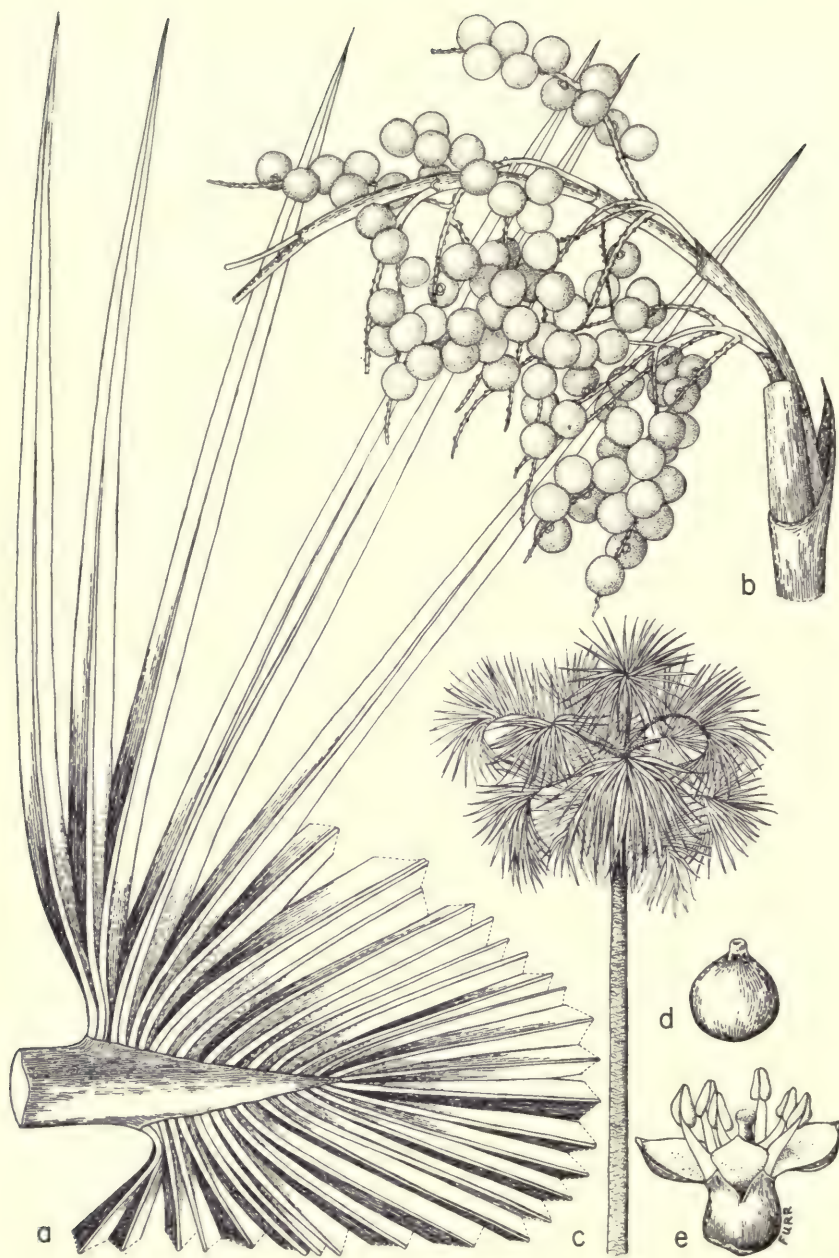


FIG. 49. *Sabal mexicana*. a, Portion of leaf ( $\times \frac{1}{4}$ ). b, Portion of fruiting branch ( $\times \frac{1}{4}$ ). c, Habit (greatly reduced). d, Fruit, showing calyx ( $\times 1\frac{1}{2}$ ). e, Flower ( $\times 5$ ).

In forest, little above sea level, Petén (type from Uaxactún, *H. H. Bartlett 12284*). British Honduras (Stann Creek Valley and elsewhere).

Plants very slender and tall, sometimes 27 meters high, the trunk 20–25 cm. in diameter, smooth, light-colored, the wood hard; leaves 2 meters broad or less, cleft almost to the base, light green above, silvery beneath, the segments 4–5 cm. wide toward the base, long-tapering; petiole equaling the blade or slightly longer, somewhat scurfy, the ligule 7–10 cm. long, long-acuminate; inflorescences conspicuously exceeding the leaves, divaricately branched, the branchlets stout, terete, at least 1 mm. thick when dry, not filiform at the ends, 5–7 cm. long; fruit black, lustrous, globose, somewhat narrowed at the base, 9–10 mm. broad, 10–11 mm. high; seed lustrous dark brown, 7–8 mm. in diameter, the micropyle lateral and prominent.

In Petén the leaves are highly prized as thatch, and on this account the trees usually are left when land is cleared for cultivation.

**Sabal nematoclada** Burret, *Repert. Sp. Nov.* 48: 256. 1940.

In open or rather dense forest, sometimes growing with pines and on limestone, at or little above sea level; British Honduras (type from Forest Home, *W. A. Schipp 8443*; San Agustín and elsewhere).

Plants very tall and slender, as much as 27 meters high; leaves about 2 meters long, green above, somewhat paler but not silvery beneath, very deeply divided into numerous segments, these 6 cm. wide; ligule of the leaf 6–7 cm. long, narrowly acuminate; spadix much branched, the branchlets very slender, 1 mm. thick, almost filiform at the apex, 12 cm. long or shorter; flowers cream-colored, closely placed, 3 mm. long, subtended by ovate-acuminate bracts and bractlets; calyx narrowly obovate-oblong, not conspicuously nerved, the lobes ovate-triangular; petals when dry narrow and with involute margins; fruit black or nearly so, lustrous, obovoid-pyriform, 8–10 mm. in diameter; seed about 8 mm. in diameter, free from the mesocarp, the micropyle supralateral, obscure.

### SCHEELEA Karsten

*Reference:* Burret, *Notizbl. Bot. Gart. Berlin* 10: 651. 1929.

Low or tall, unarmed palms, the caudex solitary; leaves terminal, pinnatisect, the segments seriate or grouped, linear, 1-nerved, the sheath short, open; spadices on long or short peduncles, the branches rather short, suberect; spathes 2, the upper fusiform, ligneous, acuminate, the bracts minute; flowers dioecious or monoecious on the same spadix, the staminate very numerous, sessile on the upper part of the branches, crowded, the pistillate few and solitary on the lower part of the branch, sessile or pedunculate; spadices inserted among the leaves; staminate sepals minute, triangular, acute, the petals much longer, elongate-claviform or cylindraceous, fleshy, acute, valvate; stamens 6, much shorter than the petals, the filaments filiform, unequal, the anthers linear, affixed by the bifid base, erect; pistillate flowers much larger than the staminate, ovoid, the perianth greatly enlarged after anthesis, the sepals large, coriaceous, ovate, nerved, imbricate, the petals similar but

somewhat larger, convolute-imbricate; ovary 3-celled, the style short, terete, the stigmas large, spreading, the ovules basal, erect; fruit large, ovoid or oblong, 1-3-seeded, the style terminal, the pericarp fibrous, the endocarp thick, osseous, fibrous outside, 3-pored above the base; seeds ellipsoid, the testa veined by the branches of the raphe, the endosperm corneous, uniform, the embryo opposite one of the pores.

The genus consists of about 40 species, most of them South American. Three or four besides those enumerated here are known from Mexico and Central America.

Fruiting perianth 30-35 mm. long; plant of the Atlantic lowlands. . . . .*S. Lundellii*  
 Fruiting perianth 12 mm. long; plants of the Pacific plains. . . . .*S. Preussii*

**Scheelea Lundellii** Bartlett, Carnegie Inst. Wash. Publ. 461: 46. *pl.* 1-5. 1935. *Corozo*; *Cantutz* (Maya).

In forest, little above sea level (250 meters or less); Petén (type collected near Polol, *C. L. Lundell 3752*; reported from Río Subín and Río Pasién); Alta Verapaz (between Candelaria and Samanzana).

Mature plants as much as 20 meters high, the trunk naked below, covered above by the remains of old leaves and inflorescences; leaves up to 8 meters long, the lowest ones almost horizontal, the petiole quadrangular, dilated at the base, splitting at the base into long, stiff, flexuous fibers, the rachis quadrangular, densely covered beneath with a rufous-ferruginous indument; leaf segments numerous, rigid, entire, the lowest 90-120 cm. long, 1.4-2.8 cm. wide, the middle ones 120-125 cm. long and 6-6.5 cm. wide, irregularly grouped and spaced; upper spathe ligneous, the principal portion fusiform, 90 cm. long, 25 cm. in diameter, attenuate into a spinelike, terminal appendage 45 cm. long; lower spathe 80 cm. long; peduncle ferruginous-furfuraceous, the spadix densely and simply branched, the branches 25-35 cm. long, 2-4 mm. thick; staminate flowers 16-18 mm. long, the calyx segments only 1.5 mm. long, the petals clavate; anthers 3.5-4 mm. long; fruit ellipsoid, rostrate at the apex, 6.5 cm. long, 2.8-3.4 cm. in diameter, dark brown, the endocarp osseous, almost 5 cm. long.

In general appearance this and the following species are almost exactly like the common cohune, *Orbignya Cohune*. In flower structure the two genera are unlike, the anthers of *Orbignya* being greatly elongate and spirally twisted, those of *Scheelea* short and straight. It is stated that in Petén *Scheelea Lundellii* and *Orbignya Cohune* grow together, forming forests or *corozales* characteristic of that region.

**Scheelea Preussii** Burret, Notizbl. Bot. Gart. Berlin 10: 678. 1929. *Corozo*; *Coquito*; *Manaca*.

Abundant at many places on the Pacific plains, and probably in all the coastal departments, at or little above sea level, ascending to perhaps 900 meters but most common at lower elevations; Escuintla; Suchitepéquez; Retalhuleu; San Marcos; perhaps endemic; type col-

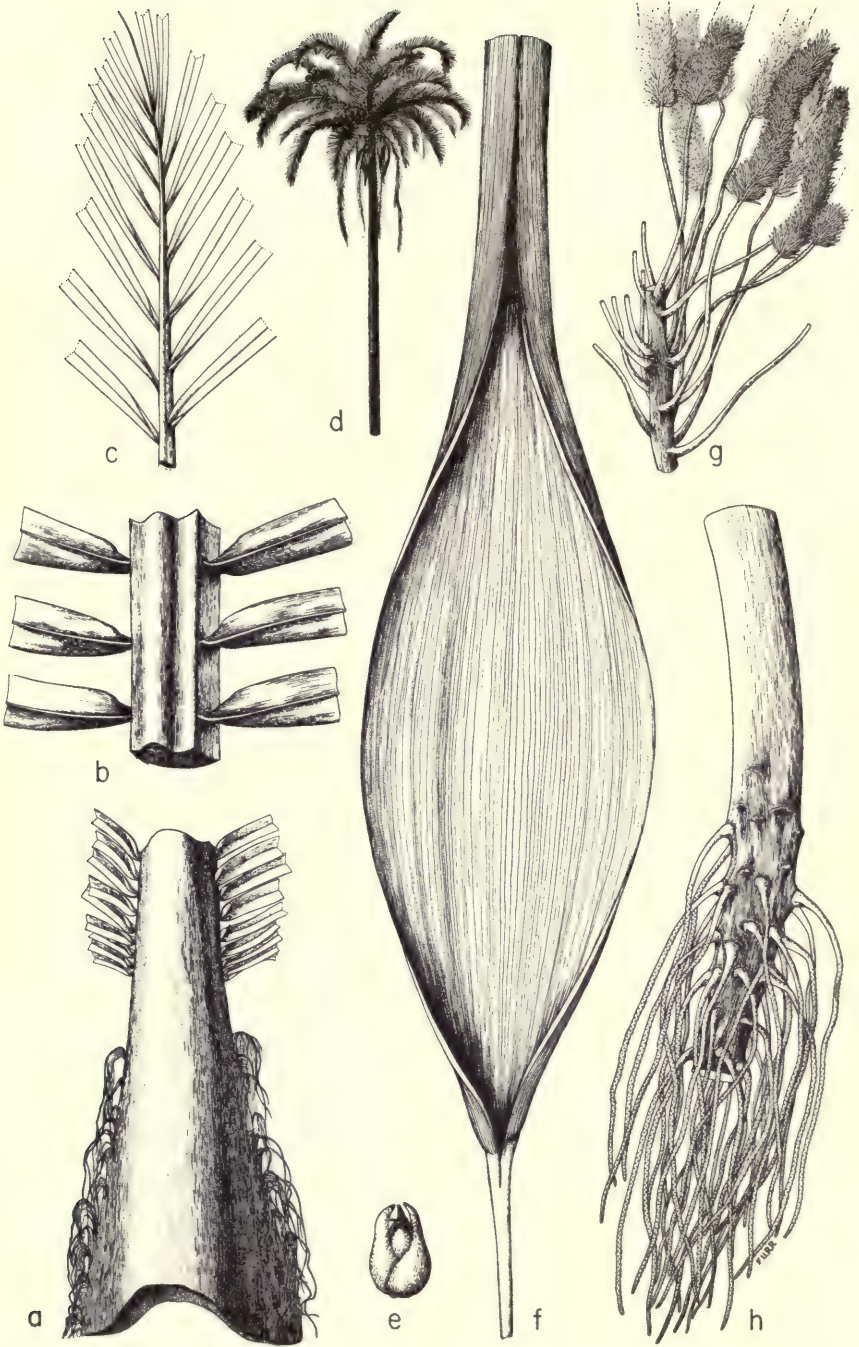


lected by Preuss in Guatemala, on the "Pacific side," but the locality unknown. Southern Mexico (Chiapas). Figure 50.

Plants large and massive, in appearance like *Orbignya Cohune*, large plants often acaulescent, but the trunk elongating in age and commonly 3–6 meters high or taller, thick and very solid; leaves large, 3.5 meters long or often considerably longer, the rachis narrowly triangular in cross section, fuscous-leprous dorsally, the segments narrowly reduplicate at the base, equally spaced and inserted in the same plane, the larger ones 120 cm. long, the terminal segments about 30 cm. long; spathe about 140 cm. long, cymbiform (when opened), ligueous, slender and scarcely more than 5 cm. in diameter; spadix about 115 cm. long, the branched portion 70 cm. long, the branches numerous, 30 cm. long, almost filiform at the apex; staminate flowers 15 mm. long; fruits very numerous, elongate-ellipsoid, about 5 cm. long and 2.5–3 cm. broad, rounded at each end, rostrate at the apex, the beak 3–5 mm. long; pistillate sepals ovate-oblong, the petals of equal length, rounded.

This is probably a forest palm by nature, but it is most plentiful now on open pastured plains from which the original forest has been cut. In many places along the Pacific plains it is abundant, forming wide stands—almost palm forests. Much of the land on which it is found is very wet during the *invierno*, and some of the trees stand in depressions that are wet throughout the year. We have not seen it in Santa Rosa but there is in that department an *aldea* called El Corozal, which probably attests its presence there, and it is rather probable that this species may extend into western El Salvador. The names "corozo" and "manaca" are both given commonly to this palm along the Pacific coast, just as they are applied to the so similar *Orbignya* of the Atlantic lowlands.

This palm is of great economic importance locally. Its leaves are the commonest thatch of the humbler dwellings of the Pacific coast, and even of some of the more substantial ones. San Sebastián Retalhuleu is celebrated for its manufacture from the corozo of *suyacales* (rain capes), which are sold locally and exported to distant parts of Guatemala, also for its *sopladores*, the fans so necessary for starting kitchen fires, particularly those burning charcoal. Bunches of the nerves from the leaves are used as brooms and coarse brushes. The cabbage, called "palmito," is eaten either raw or cooked. Sap that collects in the cavity from which the cabbage is cut is allowed (sur-reptitiously, since it is forbidden by law) to ferment with *panela* or crude brown sugar to form an intoxicating beverage like that prepared from *Acrocomia*. The fruits and nuts are eaten by cattle, and the scant flesh is often eaten by people. The kernels are said to be used sometimes for making confections, and there is extracted from them an oil used in making soap. At San Antonio Suchitepéquez there is a small factory where the oil is expressed by pressure; it is



used to make the Jabón Vegetal that is highly esteemed in Guatemala for toilet purposes. The nuts are cut transversely and shaped to make small pipe bowls. The trunks are used for various kinds of construction and sometimes for fuel.

### SCHIPPIA Burret

Plants unarmed, the caudex cylindric, without spinose roots; petioles unarmed, biconvex; leaf blades fan-shaped, many-cleft, without tomentum, the segments not filiferous; rachis none; spathes broad, the lowest sterile, the succeeding ones subtending twice-branched inflorescences; flowers spirally arranged on the branchlets, solitary, perfect and staminate, pseudopedicellate; calyx small, the 3 sepals free, lance-triangular; corolla much longer than the calyx, the 3 petals free, oblong, reflexed; stamens 6, hypogynous, equal, the filaments free, elongate; anthers dorsifixed, versatile, linear, deeply sagittate at the base; carpel of the ovary 1, ovoid, 1-celled; style narrowly tubular, obliquely expanded above into the stigma; ovule basal, ascending; fruit rather large, globose, the persistent style base apical, the perianth scarcely accrescent in age, the pericarp thin, fragile, fleshy within; seed globose, with a basilar hilum, the raphe basilar, not conspicuous; endosperm corneous, uniform, slightly excavate at the base, the embryo lateral.

The genus was named for William A. Schipp, who made what is probably the most important collection of plants ever gathered in the colony of Belize, one from which a very large number of new species, many of them important ones, have been described. He seems to have had, more than any other collector who has worked in British Honduras, the faculty of finding and collecting the interesting plants of the region, rather than the common and weedy ones. Burret considers *Schippia* most closely related to the South American genus *Tessmanniophoenix*.

**Schippia concolor** Burret, Notizbl. Bot. Gart. Berlin 11: 868. 1933.

Moist or wet, lowland forest, mostly at 200 meters or lower; Petén (west of Chinajá, *Steyermark* 45538). British Honduras, the type from 19 Mile, Stann Creek Valley, *W. A. Schipp* S367.

Plants about 10 meters high, the trunk 10 cm. in diameter; petiole about 2 meters long, fuscous-tomentose below, glabrate above, 1 cm. broad, the ligule tri-

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FIG. 50. *Scheelea Preussii*. *a*, Basal part of leaf, showing basal portions of leaf segments ( $\times \frac{1}{8}$ ). *b*, Middle part of leaf rachis, showing basal portions of leaf segments ( $\times \frac{1}{3}$ ). *c*, Apex of leaf, with basal portions of leaf segments ( $\times \frac{1}{3}$ ). *d*, Habit of tree (greatly reduced). *e*, Pistillate flower ( $\times \frac{2}{3}$ ). *f*, Spathe ( $\times \frac{1}{6}$ ). *g*, Portion of staminate inflorescence ( $\times \frac{1}{3}$ ). *h*, Portion of pistillate inflorescence ( $\times \frac{1}{3}$ ).



angular, acuminate; leaf blade almost concolorous, 65 cm. long, cleft about two-thirds its length, with about 32 segments, these 3–3.5 cm. wide, gradually attenuate upward; spadix twice or thrice branched, pendent, about 60 cm. long; sterile spathes about 25 cm. long, cochleariform, contracted at the apex, floccose-tomentose outside with a yellowish tomentum, the fertile spathes about 4, the uppermost 8.5 cm. long, the partial inflorescences large, the 2 lowest 25 cm. long or more, the upper ones smaller; branchlets numerous, regularly inserted, often approximate, slender, glabrous, the larger ones about 12 cm. long; flowers inserted spirally, solitary, on pedicels 3–4 mm. long; sepals narrow, almost linear-triangular, scarcely 1 mm. long; petals reflexed, membranaceous, 3 mm. long, oblong, subcucullate at the apex; stamens 3 mm. long, the filaments slightly dilated below and applanate; anthers linear, 1 mm. long; ovary ovoid, glabrous, abruptly contracted into the style; fruit globose, about 2.5 cm. in diameter when dried, lustrous, minutely granulose; seed subglobose or depressed-globose, rounded at the apex, the largest 18 mm. high and 20–22 mm. broad.

Called “silver pimento” and “mountain pimento” in British Honduras.

### SYNECHANTHUS Wendland

Unarmed plants, often gregarious, the stems slender, annulate, often stoloniferous; leaves terminal, equally pinnatisect, the segments broad or narrow, thin, plicate-nerved, acuminate, often interrupted, the petiole canaliculate above, the sheath short, open; spadices several, long-pedunculate, erect in flower, the branches very numerous and slender, flexuous, strict, compressed; spathes several, tubular, membranaceous, persistent; flowers minute, monoecious in the same spadix, arranged in alternate, elongate, 1–2-seriate groups, the upper flowers of the group staminate, the lowest one pistillate, ebracteate and ebracteolate; staminate flowers trigonous-hemispheric, the calyx cupular, fleshy, trilobate; petals 3, connate at the base, concave, spreading, valvate; stamens 3 or 6, the filaments short, subulate, the anthers globose-didymous, dorsifixed; staminate flowers about as large as the pistillate, hemispheric, the perianth unchanged after anthesis; petals 3, orbicular, imbricate; ovary globose, 3-celled, the stigmas minute, sessile, the ovules erect; fruit ellipsoid, 1-seeded, the stigmas basal, the pericarp with thin flesh and numerous fibers, the endocarp membranaceous; seed erect, free, ellipsoid, the hilum small, basal, the raphe sigmoid, the embryo infra-apical.

The genus consists of six species, four in Central America, one in Mexico, and one in Ecuador. In appearance the plants are similar to *Chamaedorea*, but they differ in the inflorescence, whose long slender flexuous bunched branches give it a broom-like appearance.

***Synechanthus fibrosus*** Wendland, Bot. Zeit. 16: 145. 1858; Bot. Mag. pl. 6572. 1881. *Chamaedorea fibrosa* Wendl. Index Palm. 12, 57. 1854; *Collinia fibrosa* Wendl. loc. cit.; *Rathea fibrosa* Karst. in Koch & Fint. Wochenschr. 1: 377. 1858. *Pacaya*; *Capuca*; *Coquilla*.

Wet forests, chiefly at or near sea level, but ascending to about 900 meters; often growing on limestone; originally described from

cultivated plants of Guatemalan origin; Alta Verapaz; Izabal. British Honduras; Honduras. Figure 51.

Plants slender, rarely as much as 6 meters high, usually much lower and often flowering when no more than 1.5 meters high, the stems smooth, green, cane-like; leaves few, green on both surfaces, about a meter long but often larger, the segments linear to lanceolate, numerous, mostly 1.5–3 cm. wide, or a few of the upper ones much wider; spadices inserted among or just below the leaves, the peduncles greatly elongate; branched portion of the spadix 30–40 cm. long, the branches usually very numerous but sometimes few, pendent in age; flowers scarcely more than 1 mm. long, the sepals strongly costate-nerved; fruit oblong or ellipsoid, becoming yellow and at maturity cherry-red, as much as 2 cm. long.

Called “monkey-tail palm” in British Honduras.

### THRINAX L. f.

*Reference:* L. H. Bailey, *Thrinax*—the peaberry palms, *Gentes Herb.* 4: 128–149. f. 75–85. 1938.

Rather small palms, unarmed, the trunk naked, more or less annulate; leaves fan-shaped, long-pedunculate; inflorescences inserted between the leaves, the flowers perfect, minute; leaves divided for half their length or more, the petiole smooth, the ligule with a point or rim projecting over the blade; spadix usually equaling or exceeding the petioles, branched, glabrous or partly so, provided with small pointed secondary spathes at the nodes; flowers very small, consisting of a cup with 6 short lobes in a single series and no petals, the calyx persistent beneath the fruit; stamens 6, the filaments more or less expanded at the base and sometimes mistaken for petals after the anthers fall, the anthers long, exserted, 2-celled, introrse, often reflexed in anthesis; ovary 1-celled, globose or short-oblong, narrowed into a columnar style; fruit globose, bearing the persistent style, the exocarp succulent at full maturity but soon drying hard, white to gray or purplish when fresh but becoming blackish or brown when dry, glabrous at maturity, 10–12 mm. or less in diameter; seed free, the raphe obscure, the embryo and micropyle lateral toward the apex.

Ten species were recognized by Bailey, most of them West Indian, but the genus is represented also in southern Florida, the Yucatan Peninsula of Mexico, and northern south America. No other species have been found in Central America, but the genus may occur along the Atlantic coast of Honduras.

*Thrinax parviflora* Swartz, *Fl. Ind. Occ.* 1: 614. *pl.* 13. 1797.  
*T. Wendlandiana* Beccari, *Webbia* 2: 265. 1907.

At sea level, often on coral rocks or sand; British Honduras (All Pines, and reported elsewhere); Turneffe Island; Florida Keys; Jamaica; Haiti; Yucatan Peninsula of Mexico; Honduras(?). Figure 52.

A slender erect palm 3–9 meters high, the trunk enlarged at the base, at the middle sometimes 10 cm. in diameter and obscurely if at all annulate; leaves light



FIG. 51. *Synechanthus fibrosus*. a, Portion of leaf ( $\times \frac{1}{2}$ ). b, Lower portion of flowering branch ( $\times \frac{1}{2}$ ). c, Lower portion of fruiting branch ( $\times \frac{1}{2}$ ). d, Habit of fruiting plant (greatly reduced).



green, the blades sometimes 1 meter wide or more, the petioles 60–100 cm. long, thin and 2-edged, bearing many marginal fibers below; ligule broad, with a low upturned margin, produced into a prominent triangular point; leaf blades cleft almost to the middle into 50 or more segments, these mostly narrow, sometimes 3 cm. wide; spadix about a meter long, the ultimate branchlets 4–8 cm. long, the flowers rather closely placed, conspicuously pedicellate, variable in size; anthers longer than the filaments, the stigma expanded as if urceolate; fruit globose, 6 mm. in diameter, drying regularly with a thin brittle shell, this finely granulate; seed 4–5 mm. in diameter.

In Yucatan this palm is said to be known by the Maya name "chit." *Thrinax microcarpa* Sargent was said by Bailey to be "supposedly in Yucatan and British Honduras," but we know of no evidence that it grows there.

### WASHINGTONIA Wendland

*Reference:* L. H. Bailey, *Gentes Herb.* 4: 53. 1936.

Plants, when well developed, tall and robust, the trunk solitary, columnar, covered above or sometimes throughout with pendent remains of dead leaves; leaves large, filiferous, glabrous or nearly so, the petioles stout, compressed, armed with spines on the margins, the blades rounded and fan-shaped; spadices inserted among the leaves, 2–4 meters long, usually projecting beyond the leaves and recurved or pendent, 1–3 times branched, the branchlets slender, glabrous; principal spathe about a meter long, compressed and 2-edged, 10 cm. broad; flowers perfect, whitish, short-pedicellate, about 8 mm. long (including the stamens), the calyx tubular, almost equaling the 3 strongly reflexed, narrow corolla lobes, persistent; stamens 6, attached at the base of the corolla, the anthers large and elongate, versatile; ovary trilobate, 3-celled, the style long, straight, tridentate at the apex; fruit hard, oblong to oblong-globose, 5–10 mm. long, smooth, with scant flesh, brown; seed brown, the endosperm white, hard, uniform.

Two species are known, native in southern California and Arizona and northwestern Mexico, where they grow in dry, semi-desert regions. They have become favorite palms in cultivation not only in America but in other regions, partly because of their hardiness and also because they thrive under adverse conditions, either out of doors or as house plants.

**Washingtonia filifera** (Lind.) Wendl. *Bot. Zeit.* 37. 68. 1879.  
*Pritchardia filifera* Lind. *Cat.* 1876, ex André, *Ill. Hort.* 24. 1877.  
*Palma peluda*.

Native of southwestern Arizona, southeastern California, and northern Sonora and Baja California; often planted for ornament in Guatemala, especially in the central region, but also in other places, such as Zacapa, Retalhuleu, and Almolonga; plants often seen grow-

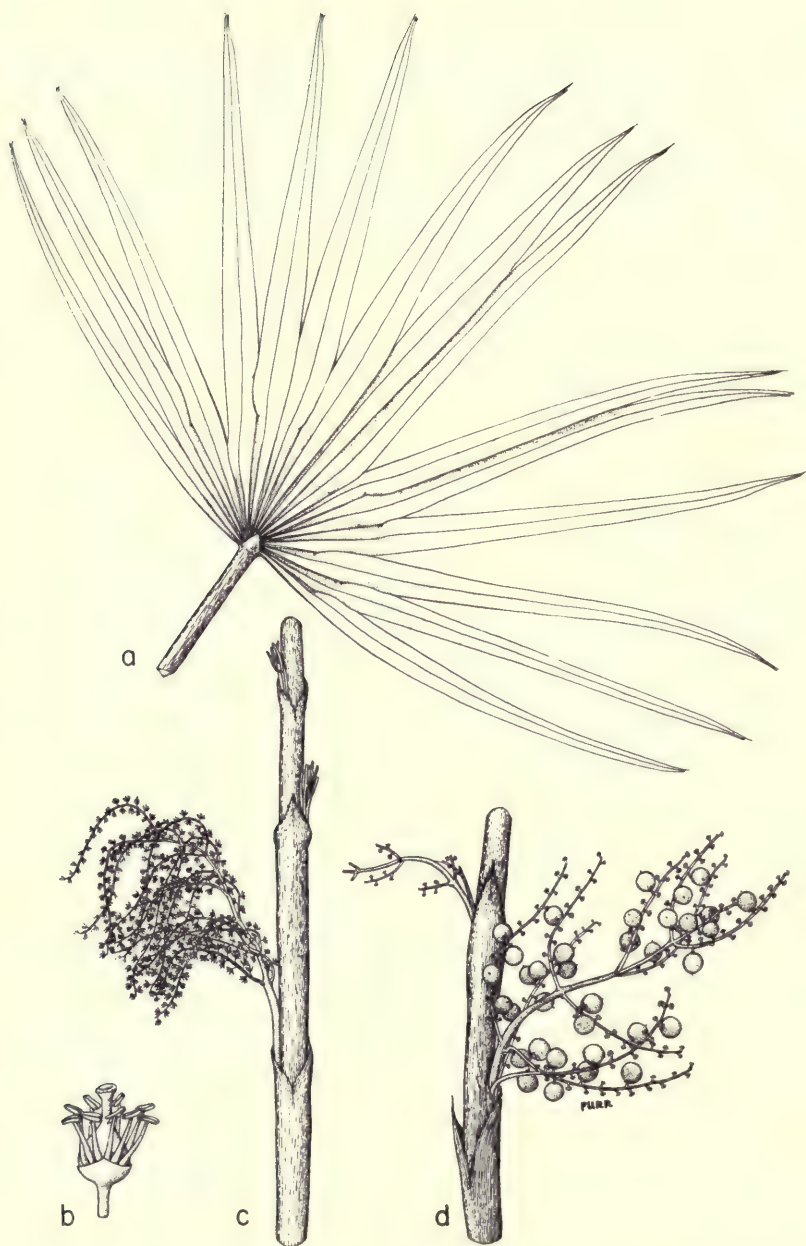


FIG. 52. *Thrinax parviflora*. *a*, Portion of leaf ( $\times \frac{1}{10}$ ). *b*, Flower ( $\times 5$ ). *c*, Flowering branch and attachment to stem ( $\times \frac{1}{2}$ ). *d*, Fruiting branch and attachment to stem ( $\times \frac{1}{2}$ ).

ing in places where the seeds probably were dispersed by accident, and not purposefully planted.

Trunk sometimes 15 meters high and 1 meter in diameter, but in cultivation usually smaller, often covered throughout with reflexed dead leaves, but these more often removed by man or destroyed by fire; petiole 2 meters long or less and 10–15 cm. broad at the base, the somewhat uncinat marginal spines 1 cm. long or less; blades as much as 2 meters in diameter; spadices mostly 3–4 meters long at maturity, pendent in fruit; calyx 5 mm. long, shallowly lobate, the striate petals reflexed to the base of the flower, the stamens about twice as long as the calyx; fruit short-oblong to ovoid, 7–10 mm. long; seed 5–7 mm. long.

### CYCLANTHACEAE

Large and coarse, acaulescent, perennial herbs, palm-like in appearance, or scandent shrubs with annulate vaginate rooting stems; leaves distichous or spirally arranged, petiolate and flabellate, entire, bifid, or biparted, parallel-nerved; flowers monoecious, those of each sex densely crowded in whorls or spirals on a thick spadix; spadices axillary, solitary, pedunculate, simple, the peduncle short or elongate, subtended at the base by a bicarinate cataphyll; spathes 2–6, inserted on the peduncle and enclosing the inflorescence before anthesis, caducous; staminate flower without a perianth, or the perianth stipitate, oblique, with a multidentate orifice; stamens numerous, the filaments confluent with the perianth tube and with one another, free above, the anthers adnate to the filament, ovoid or linear, dehiscent by longitudinal slits; pistillate perianth none or of 4 short, distinct or connate segments, these often confluent with those of adjacent flowers and forming a persistent multidentate annulus, often accrescent after anthesis and in fruit indurate; staminodia in the pistillate flower usually 4, short or long and flexuous; ovary free or immersed below in the axis of the spadix and adnate to it, depressed-quadrate, truncate or 4-lobate at the apex, 1-celled; style none or short and pyramidal, the stigmas solitary, or 4, depressed, and stellately spreading; ovules numerous, the placentae parietal or pendulous from the apex of the cell; fruit a fleshy syncarp, composed of distinct or confluent berries crowned by the depressed stigmas, the placentae swollen and fleshy; seeds numerous, small, sessile or pendulous, on a short funicle, the testa fleshy; endosperm fleshy and oily or corneous, the embryo minute, straight or curved.

The family consists of 4 genera of plants confined to tropical America. In general appearance they suggest palms, and are likely to be confused with that group by one unfamiliar with the tropical flora.

Leaves with 2 stout ribs 4–5 mm. broad near the base and extending nearly the length of the segments, much more conspicuous than any other nerves, the leaf surface mostly smooth and not conspicuously ribbed or nerved; flowers arranged in rings, these alternately staminate and pistillate; perianth none in the staminate flower; sap milky . . . . . *Cyclanthus*

Leaves with the 2 or 3 stoutest ribs at most 1.5–2 mm. broad near the base, scarcely or not at all more conspicuous than other nerves, the leaf surface with numerous conspicuous ribs or nerves protruding above the leaf surface; flowers not in rings, the staminate in clusters of 4 around a solitary pistillate flower; perianth present in the staminate flower; sap watery . . . . . *Carludovica*



## CARLUDOVICA Ruiz &amp; Pavón

Acaulescent terrestrial herbs, or epiphytic herbs or shrubs, often with greatly elongate and scandent stems rooting at the nodes; leaves alternate or fasciculate, rarely distichous, bifid or palmately parted, very rarely entire, the segments multicostate, entire or dentate, the short or elongate petiole vaginate-sheathing at the base; spadix oblong or cylindric; spathes 2 or more, caducous, concave; flowers arranged in dense spirals, 4 staminate ones surrounding a single pistillate flower; perianth of the staminate flower stipitate, oblique, fleshy, multidentate; stamens numerous, the anthers didymous, oblong, exserted, dorsifixed; pistillate flower free or immersed in the rachis and adnate to it, the perianth 4-angulate, 4-fid, or 4-parted, the segments or lobes obtusely quadrate, persistent and indurate; staminodia 4, greatly elongate, filiform, deciduous; stigmas 4, sessile, stellately spreading; ovules very numerous.

The genus consists of perhaps 50 species, widely dispersed in tropical America. Some are found in Central America, especially in Costa Rica and the mountains of Panama, where the species are more numerous and the plants more conspicuous and abundant. A few species occur in southern Mexico. In Guatemala the number of species is small, and the plants are rarely conspicuous. In some regions of Central America the long and flexible stems of the scandent species are used for making baskets and a kind of furniture similar to that made from willow (*Salix*) branches. The ripe fruits of some species are intensely fragrant at maturity and juicy. They are eaten, at least in the southwestern part of Guatemala, by the Indians. The generic name commemorates Carlos XI of Spain and his queen, Luisa.

Leaves 3-4-parted, the petioles mostly 1-2 meters long. Plants always terrestrial.

*C. palmata*

Leaves bifid, the petioles much shorter.

Leaf segments mostly 8-15 cm. wide and 40-95 cm. long; fruiting spadix usually 6-8 cm. long. . . . . *C. utilis*

Leaf segments 1-8 cm. wide, 10-40 cm. long; fruiting spadix 4 cm. long or less.

Leaf segments mostly 1-3 cm. wide; spathes 6-8. . . . . *C. microphylla*

Leaf segments mostly 3-8 cm. wide; spathes 2. . . . . *C. microcephala*

**Carludovica microcephala** Hook. f. Bot. Mag. *pl.* 7263. 1892.

Wet, mixed forest, growing almost always along or near stream banks, frequently on limestone, 1300 meters or lower; Alta Verapaz; Izabal; Quezaltenango. Honduras; Costa Rica; Panama.

Plants always terrestrial, small, the caudex very short or practically none, the leaves few; petioles slender, elongate, 40 cm. long or shorter, the blades deeply bifid, firmly membranaceous, the segments narrowly oblong-lanceolate, 15-40 cm. long, mostly 3-8 cm. wide, long-attenuate, 8-24-nerved; peduncles shorter than the petioles, slender, with 2 brown lanceolate appressed sheaths at the base; spadix small, in fruit 4 cm. long or less, oblong, obtuse, with only about 8 groups of flowers;

spathes 2, pale green, ovate to broadly lanceolate, 2.5–6.5 cm. long; staminodia 3.5–4.5 cm. long.

**Carludovica microphylla** Oerst. Vid. Medd. Kjöbenhavn 1857: 197. 1858.

Wet, mixed forest, 100 meters or lower; Izabal (base of Sierra del Mico). Costa Rica; Panama.

Usually an epiphytic vine with long, slender stems, ascending tall trees, rarely terrestrial along rocky stream banks; leaves short-petiolate, bilobate to below the middle, the segments linear-lanceolate, abruptly caudate-acuminate, usually 4–8-nerved, mostly 10–15 cm. long; peduncles somewhat shorter than the petioles; spadix green, 2.5–3 cm. long.

**Carludovica palmata** Ruiz & Pavón, Syst. Fl. Peruv. 291. 1798. *Calá* (Pancajché, Alta Verapaz); *Palmilla*; *Palmero*; *Pojóm* (Huehuetenango); *Jiraca*.

Moist or usually wet, mixed, lowland or mountain forest, sometimes in open places, especially in second growth, 800 meters or lower; Petén; Alta Verapaz; Izabal; Suchitepéquez; Retalhuleu; San Marcos; Huehuetenango; often planted for ornament. Southern Mexico to Panama; extending southward to Peru.

Plants terrestrial, acaulescent, often forming large clumps or colonies, the slender stiff green petioles 1–2 meters tall, the blades 3–4-parted, a meter broad or smaller; inflorescences much shorter than the petioles, pedunculate; spadix 10–20 cm. long, red at maturity; staminodia very conspicuous in anthesis, as much as 15 cm. long, hairlike, white.

Called “junco” in Honduras; “soyacal” (Tabasco). The Panama hat palm is a well-known and easily recognized plant of the rain forests of Central America, where the fiber is used in the manufacture of hats and other textiles. The fiber, or more properly narrow strips of the very young leaves, is notable for its strength, durability, and flexibility. From it are made the well-known Panama hats—in Central America “sombreros de Jipijapa”—which, despite their English name, are *not* made in Panama but in a restricted area of Ecuador where atmospheric conditions are particularly suitable for their handling. These hats are imported in quantity into Guatemala and other Central American countries, and are so esteemed that poor people often buy them at very high prices. Because of its handsome appearance, the Panama hat palm is grown commonly for ornament in parts of Guatemala where it is not native, and at rather high elevations of 1500 meters or more, far above the zones where it grows wild.

**Carludovica utilis** (Oerst.) Benth. & Hook. ex Hemsl. Biol. Centr. Amer. Bot. 3: 416. 1885. *Sarcinanthus utilis* Oerst. Vid. Medd. Kjoebenhavn 1857: 197. 1858. *Tepejilote* (Quezaltenango; probably an erroneous name); *Cuajilote* (Huehuetenango). Figure 53.

Wet, mixed forest of the mountains or lowlands, mostly at 300–1500 meters; Alta Verapaz; Izabal; Sololá; Suchitepéquez; Quezaltenango; San Marcos; Huehuetenango. British Honduras to Panama.

Plants terrestrial and acaulescent or often epiphytic or scandent and with much elongate stems; petioles slender, equaling or shorter than the blades; leaf blades bifid to below the middle, mostly 40–95 cm. long, with 3 main costae, the segments 7–15 cm. wide or wider, abruptly short-acuminate, 8–32-nerved; peduncles much shorter than the petioles; spathes 5, remote, 5–10 cm. long; spadix oblong, with numerous groups of flowers, rounded at the apex.

The leaves were used formerly for weaving hats similar to Panama hats, and probably they still are used locally in this manner. The stems of the epiphytic plants are stout, very flexible, and tough.

### CYCLANTHUS Poiteau

Plants terrestrial, acaulescent, with milky sap; leaves arranged spirally, petiolate, the blades deeply bifid; spadix subtended by 5–7 petaloid or somewhat foliaceous, large spathes; staminate and pistillate flowers borne on the same spadix, in separate alternating whorls, the flowers of each whorl adnate and confluent; staminate flowers naked; pistillate flowers enclosed by 2 rings of fleshy tissue representing the concrescent perianths; staminodia numerous, short; fruit a syncarp, consisting of the several fleshy whorls of pistillate flowers, the whole suggestive of a large screw.

The genus consists of two or three species, all tropical American. Only the following is known from North America.

**Cyclanthus bipartitus** Poit. Mém. Mus. Paris 9: 35. *pl.* 2, 3. 1822. *Cola de pava*; *Palmiche*.

Wet, mixed, lowland forest, 350 meters or lower; Alta Verapaz; Izabal; Huehuetenango. Honduras; Costa Rica; Panama; southward to Peru and Brazil.

Plants caespitose, often forming large dense clumps, 1–2 meters high; petioles 50–100 cm. long, the blades of the same length or longer, bifid almost to the base, thick, not plaited or conspicuously costate, the segments broadly linear-lanceolate,

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FIG. 53. *Carludovica utilis*. *a*, Staminodia ( $\times 2$ ). *b*, Stamen ( $\times 15$ ). *c*, Portion of flowering shoot with leaf ( $\times \frac{1}{4}$ ). *d*, Surface of pistillate flower, from above ( $\times 3\frac{1}{2}$ ). *e*, Staminate flower, lateral view ( $\times 3\frac{3}{4}$ ). *f*, Inflorescence, showing spathes ( $\times \frac{1}{2}$ ).





7–15 cm. wide, acute or acuminate, with a stout costa; peduncles elongate, arising from the base of a cluster of leaves; spathes 4–5, 20–22 cm. long, green, longer than the spadix, the inner ones greenish white, oblong-lanceolate, cuspidate; spadix with 8–12 whorls of pistillate flowers, in fruit as much as 22 cm. long and 5 cm. thick.

## ARACEAE. Arum Family

*Reference:* Engler & Krause, Pflanzenreich IV. 23.

Plants terrestrial or more often epiphytic, usually glabrous, acaulescent or with erect or scandent stems, often with tuberous roots; leaves petiolate, entire, lobate, or parted, the petioles sheathing at the base; reduced leaves or cataphylls often present on the stems; peduncles simple, axillary or terminal; flowers small, perfect or unisexual, arranged on a terete elongate spadix, the pistillate flowers below, the staminate above, the spadix subtended by a foliaceous spathe, this persistent or deciduous in fruit; perianth none, or of 4–6 segments, these distinct or connate; stamens 1–many, distinct, hypogynous; ovary usually entire, 1–many-celled; style none or present and elongate; ovules 1 or more in each cell; fruit baccate, the berries free or often connate, containing 1–many seeds.

More than 100 genera, widely dispersed, chiefly in the tropics.

The Araceae or aroids are one of the largest families of monocotyledonous plants, the species being distributed most abundantly in tropical regions, with a few species extending into the temperate belts. Most of the American ones are epiphytes, some of them acaulescent plants, others large vines that often form mantles of showy leaves over the trunks or branches of trees. Their leaves are usually thick and fleshy, and the plants are able to withstand dryness better than many other epiphytes, yet they seldom are found in dry regions. The leaves of many aroids have attractive form and texture, and when well developed many of the species are highly ornamental. Some of them, such as the *Monstera*s and *Philodendron*s, form a conspicuous element of the epiphytic vegetation characteristic of tropical regions.

In some genera, especially those consisting of scandent plants, there is a remarkable difference in leaf form between the juvenile and the adult stages. This variation is especially marked in such groups as *Philodendron*, *Monstera*, and *Syngonium*. Juvenile plants often are so different from adult ones that it is difficult to associate the various forms. A careful study of the life histories of the Central American scandent Araceae would give interesting results, and perhaps make the determination of the juvenile forms less difficult.

Many or most of the aroids contain in their tissues needle-like crystals of calcium oxalate (at least it is usually so designated). When any portion of the foliage is chewed, these crystals penetrate

the mouth tissues, often causing intense irritation and swelling. In the case of the Araceae used for food—such as *Xanthosoma* and *Monstera*—special care must be taken in their preparation. Fruiting spadices (such as those of *Monstera*) must be fully ripened, and tubers or rootstocks must be thoroughly exposed to heat in order to eliminate the pernicious crystals.

Many of the Guatemalan plants of this family, especially *Monstera* and some species of *Philodendron*, produce long, flexible, very tough aerial roots that attain a great length when the plants grow high on trees. These roots are used very commonly in Guatemala and other parts of Central America for making the so-called *mimbre* furniture. While still moist the roots are wrapped tightly about frames of chairs and other articles of furniture, and as they dry they become still tighter, thus resembling similar furniture made in the United States from other material. The industry is locally an important one. These roots sometimes reach the United States, and we have seen samples of them from the Chicago customs house.

Plants aquatic, floating on the surface of water; leaves arranged in a rosette, spongy . . . . . *Pistia*

Plants not aquatic; leaves not forming a rosette, not spongy.

Leaves peltate. Plants with tuberous rhizomes, cultivated or escaped, always terrestrial.

Leaves green, not spotted . . . . . *Colocasia*

Leaves green but spotted with white, cream, pink or other colors . . . *Caladium*

Leaves not peltate.

Leaf blades perforated, sometimes also pinnatifid . . . . . *Monstera*

Leaf blades never perforated.

Leaves digitately compound, pedately 3–11-cleft, or pinnatifid.

Blades pinnatifid . . . . . *Philodendron*

Blades trisect or pedately or digitately 5–11-parted.

Flowers all perfect, the spadix uniform; perianth present. Leaves digitately 5–11-parted. (One Guatemalan species.) . . . *Anthurium*

Flowers unisexual, the lower part of the spadix with pistillate flowers, the upper with staminate flowers; perianth none.

Plants terrestrial, acaulescent . . . . . *Xanthosoma*

Plants epiphytic, with elongate caudices.

Spadix almost equaling the spathe; leaf blades 3-parted. (Two Guatemalan species.) . . . . . *Philodendron*

Spadix much shorter than the spathe; leaves trisect or pedately 5–11-cleft . . . . . *Synгонium*

Leaves entire, but often hastate or cordate and with basal lobes.

Flowers all or mostly perfect, the spadix uniform, not divided into a pistillate and staminate portion.

Plants terrestrial, acaulescent.





into the style, 2-celled; ovules 2 or more or often 1 in each cell; style short or none, the stigma small, discoid; berries very juicy, variable in shape and color, the cells usually 1-seeded; seeds oblong, more or less attenuate to the apex.

The largest genus of the family, with about 500 species, generally distributed in the American tropics. About 65 species are recorded for Central America, the majority in Costa Rica and Panama. Most of the species grow upon trees, but some upon rocks or even upon the ground. They are chiefly small and not very conspicuous plants, but some are rather ornamental.

Leaves digitately compound . . . . . *A. aemulum*  
Leaves entire.

Leaf blades acute to long-attenuate at the base.

Cells of the ovary normally 2-ovulate; stems usually elongate and more or less scandent; leaves small, commonly less than 5 cm. wide, and short.

*A. scandens*

Cells of the ovary 1-ovulate; stems short or obsolete, very rarely elongate; leaves small or large.

Leaves very large, commonly 12–30 cm. wide or broader, not 3-nerved.

Node of the petiole 3-carinate dorsally . . . . . *A. crassinervium*

Node of the petiole not carinate dorsally, flat.

Upper joint of the petiole, above the node, cubical . . . . . *A. tetragonum*

Upper joint of the petiole longer than broad . . . . . *A. Schlechtendalii*

Leaves relatively small, mostly less than 8 cm. wide and often 3 cm. or narrower, often conspicuously 3-nerved.

Leaf blades evidently broadest above the middle, long-attenuate to the base; axis and upper part of peduncle of spadix slender, mostly 1–1.5 mm. thick . . . . . *A. scolopendrinum*

Leaf blades broadest at or below the middle, not long-attenuate to the base; axis and upper part of peduncle of spadix broader, 2–3 mm. thick.

Plants acaulescent or nearly so; leaves mostly 20–35 cm. long or longer.

*A. Bakeri*

Plants with much elongate stems; leaves mostly 11–15 cm. long.

*A. Pittieri*

Leaf blades rounded to deeply cordate at the base.

Leaf blades deeply cordate at the base, with large and conspicuous basal lobes.

Cells of the ovary normally 2-ovulate; spathe bright red . . . *A. Scherzerianum*

Cells of the ovary 1-ovulate; spathe not red, usually green, white, or purplish, or suffused with rose.

Spadix 12–20 cm. long or longer.

Spathe linear-lanceolate, 0.4–1.2 cm. wide; spadix about 8 mm. thick or narrower; leaves mostly 12–22 cm. wide . . . . . *A. verapazense*

Spathe lanceolate, 2–6.5 cm. wide; spadix 8–20 mm. thick; leaves mostly 25–60 cm. wide.

Spadix 3–4.5 cm. stipitate; peduncles 2 cm. thick near base.

*A. titanium*

Spadix sessile, mostly 0.3–1 cm. stipitate; peduncles mostly 0.3–1 cm. thick near base . . . . . *A. concinnum*

Spadix usually much less than 10 cm. long.

- Basal lobes of the leaves separated by a very broad and open sinus; usually at 1800–2700 meters altitude. . . . . *A. montanum*
- Basal lobes of the leaves separated by a narrow oblong sinus, or the sinus closed by the somewhat overlapping lobes.
- Spathe 1 cm. wide or narrower. . . . . *A. seamayense*
- Spathe 3–5 cm. wide.
- Leaf blades subcoriaceous; spathes mostly white, not evidently nerved, opaque and thickish when dried, oblong, not conspicuously amplexicaul; at 1000–1800 meters altitude. . . . . *A. fraternum*
- Leaf blades firmly membranaceous; spathes pale green, conspicuously nerved, thin when dried, ovate to lance-ovate, conspicuously amplexicaul. . . . . *A. silvigaudens*
- Leaf blades rounded to truncate or rounded and shallowly cordate or emarginate at the base, never with large basal lobes.
- Leaves, when dried, very thick and coriaceous, the costa and primary nerves very stout and prominent.
- Leaf blades subcordate at the base, with small but evident basal lobes, the blade gradually narrowed from the base to the apex. . . . . *A. Seleri*
- Leaf blades rounded or truncate at the base, without basal lobes.
- Leaf blades, including the costa, conspicuously 5–7-nerved at the base on the lower surface, the lowest 2–3 pairs of lateral nerves conspicuous; leaf blades broadest at the base or lower half; spadix conspicuously stipitate. . . . . *A. subcordatum*
- Leaf blades with only the prominent midrib showing on the lower surface, the lateral nerves similar throughout; leaf blades of about the same width throughout or broadest at the middle; spadix sessile.
- Leaves green beneath, less than 3 times as long as wide, 12–18 cm. wide, conspicuously reticulate-nerved on both sides, the nerves prominently elevated below and sulcate above. . . . . *A. retiferum*
- Leaves glaucous or glaucescent beneath, more than 4 times as long as wide, 6–14 cm. wide, not conspicuously reticulate-nerved, the nerves not prominently elevated below or sulcate above. . . . . *A. parvispathum*
- Leaves, when dried, thin and almost membranaceous, the costa and primary nerves very slender.
- Plants acaulescent or nearly so. . . . . *A. subcordatum*
- Plants with elongate, creeping or scandent stems.
- Leaf blades rather deeply cordate at the rounded base; spadix conspicuously stipitate. . . . . *A. myosuroides*
- Leaf blades broadly rounded or broadly subcordate at the base; spadix subsessile. . . . . *A. Tuerckheimii*

**Anthurium aemulum** Schott, Bonplandia 165. 1859. *Okil* (Petén, Maya?).

Moist or wet, lowland forest, 750 meters or lower; Petén; Alta Verapaz; Izabal; Santa Rosa; Escuintla; Retalhuleu. Southern Mexico; British Honduras to Panama.



An epiphytic vine, often very large, the thick caudex with long internodes; petioles long and slender; leaf blades digitately 5-11-parted, the segments sessile or petiolulate, oblong-elliptic to oblanceolate, 20-30 cm. long in adult leaves, caudate-acuminate, narrowed to the base, thin when dried; peduncles stout, 5-10 cm. long; spathe lanceolate, green, 10 cm. long, 2.5 cm. wide at the base; spadix dull green, short-stipitate, about 5 cm. long and almost 2 cm. thick.

A conspicuous and rather handsome plant, very different from other Guatemalan species in its digitately parted leaves.

**Anthurium Bakeri** Hook. f. Bot. Mag. *pl.* 6261. 1879.

Usually epiphytic in dense wet forest, 1500 meters or lower, chiefly at very low elevations; Petén; Alta Verapaz; Izabal; Huehuetenango. British Honduras; Nicaragua; Costa Rica.

Plants acaulescent or sometimes developing a short, somewhat woody caudex, the caudex with very short internodes; petioles slender or stout, mostly one-fourth as long as the blades or shorter, rarely more elongate, dilated at the base; leaf blades narrowly elliptic-lanceolate, 30-50 cm. long, usually 3-6 cm. wide, thick and somewhat coriaceous when dried, acuminate, acute or attenuate at the base, widest at or near the middle, green above, paler green beneath, conspicuously 3-nerved, the lateral nerves very numerous and prominent, especially beneath; peduncles mostly slender and elongate, half as long as the leaves or sometimes equaling them; spathe green or bronze, usually 3.5-4.5 cm. long and 1-1.5 cm. wide, often smaller, usually rounded and apiculate at the apex, reflexed, decurrent at the base; spadix short-stipitate or subsessile, commonly 4-5 cm. long but sometimes 9 cm. long in anthesis, greenish, whitish, or purplish, very slender in anthesis, in fruit often more elongate (in the type as much as 20 cm. long and 3 cm. thick in the fresh state); berries bright red at maturity, ovoid, as much as 1 cm. long in the fresh state but much smaller when dried.

The local material is somewhat variable, and ampler collections may necessitate its division into two or more taxa. The alleged differences between *A. Bakeri* and *A. consobrinum* Schott (1855) do not appear to be stable ones, leaving considerable doubt whether they can be maintained as distinct species. They vary greatly in shape of leaf blade, and in measurements of spathe and spadix. If eventually treated as one species, the name *A. consobrinum* has priority.

The Guatemalan material was referred first to *A. Friedrichsthali* Schott, which was based on material collected by Friedrichsthal at "Cativo," said to be in Guatemala. No such locality is known in Guatemala, and it seems probable that the collection actually was made in the Panama Canal Zone.

**Anthurium concinnatum** Schott, Prodr. 522. 1860. *A. bogotense* Schott var. *concinnatum* (Schott) Engler, in DC. Mon. Phan. 2: 184. 1879.

Epiphytic or terrestrial in dense, wet forest, generally 75–1100 meters, ascending to 2000 meters in the Sierra de las Minas; Izabal; Zacapa; Chiquimula; Alta Verapaz; Huehuetenango. British Honduras; Honduras; Costa Rica; Panama.

Plants usually large and coarse; petioles 3.5–9 dm. long, geniculate 2–3 cm. below the base of the blade, the node 3–7 mm. broad; leaf blades subcoriaceous, rich green and shining above, pale green below, broadly ovate-cordate or triangular-cordate, 2.5–7 dm. long, 13–43 cm. wide, obtuse to rounded at the apex and abruptly long cuspidate-acuminate, deeply cordate at the base with a very broad and open sinus, entire, 7-nerved from the base, the lowest 2 nerves emitting usually 5 prominent nerves on the lower surface of the broadly rounded postical lobes, the primary lateral nerves slender, forming an irregular collective nerve 4–10 mm. from the margins, the veins prominulous, laxly reticulate; peduncle up to 5 dm. or more long, 0.3–1 cm. or more thick near the base; spathe coriaceous or subcoriaceous, spreading to reflexed, green, greenish-white or whitish, broadly lanceolate, abruptly cuspidate-acuminate, 6–25 cm. long, 2–5.5 cm. wide near the base; spadix in anthesis pale or dull green, lilac-buff, pink, whitish, or brownish, in fruit reddish, 6.5–24 cm. long, 8–18 mm. thick near the base, of about the same diameter throughout, slightly narrower above, usually longer than the spathe, subsessile or on a stipe usually 3–10 mm. long, rarely longer, and 3–7 mm. thick; fruits oblong or oblong-ovoid.

**Anthurium crassinervium** (Jacq.) Schott, Melet. 1: 22. 1832. *Pothos crassinervia* Jacq. Icon. 3: pl. 609. 1793. *A. Salviniae* Hemsl. Diag. Pl. Mex. 36. 1879; Biol. Centr. Am. Bot. pl. 99. 1888. *Quequesquillo*; *Colmenero*; *Baatun*, *Ucutzh box* (Petén, Maya). Figure 54.

On trees in wet forest, sometimes on wet rocks or rarely (probably by accident) terrestrial, 1400 meters or lower, most common at low elevations; Petén; Alta Verapaz; Izabal; Jalapa; Santa Rosa; Escuintla; Sacatepéquez; Retalhuleu; San Marcos. Southern Mexico; British Honduras to Panama; northwestern South America.

Plants very large, usually epiphytic, acaulescent or nearly so, the caudex thick; petioles very thick and stout, mostly 15–30 cm. long and 2–3 cm. in diameter, geniculate 1.5–2 cm. below the base of the blade, the joint as broad as long or broader; leaf blades somewhat coriaceous when dried, thick and succulent when alive, oblong-lanceolate or oblong-obovate, commonly 60–100 cm. long and 25–30 cm. wide, or sometimes even larger, acute and cuspidate, gradually narrowed to the base, the margins often undulate, the costa very thick and prominent, the primary nerves 9–14 on each side; peduncles 50–70 cm. long, about 1 cm. thick, pendent or recurved in fruit; spathe thick, bronze-green or bronze-purple, broadly linear-lanceolate, long-acuminate, clasping at the base, 6–30 cm. long and 1.5–3.5 cm. wide; spadix short-stipitate or sessile, caudiform, purplish-green, 4–30 cm. long, 0.5–1.5 cm. thick, in fruit becoming 4–5 cm. or more in diameter; berries ovoid, scarlet, 1 cm. long; seeds 4 mm. long, minutely verruculose.

Sometimes called “hoja de piedra” in Honduras. The plant is perhaps the showiest of all local species of *Anthurium* because of its



FIG. 54. *Anthurium crassinervium*. *a*, Portion of surface of spadix ( $\times 5\frac{1}{2}$ ). *b*, Pistil ( $\times 9$ ). *c*, Stamen ( $\times 9$ ). *d*, Longitudinal section through ovary ( $\times 9$ ). *e*, Sepal ( $\times 9$ ). *f*, Habit ( $\times \frac{1}{6}$ ). *g*, Flower with spathe and spadix ( $\times \frac{1}{2}$ ).



huge leaves, which usually are numerous and form a large cluster. The inflorescences are not conspicuous, but the very large and heavy fruiting spikes that hang from the base of the plant attract attention because of their vivid coloring. The plant does well in cultivation and thrives even when planted in the ground, as we observed it at Quiriguá.

There is considerable variation in the width, shape, and base of the leaf blade. *Brenes 12639* from Costa Rica shows a rounded tendency at the base of the leaf blade. In many plants the lower part of the leaf blade is narrowly attenuate to the petiole. In other collections, as in *Standley 76313* from the vicinity of Jutiapa, Guatemala, *Standley 58294* from near Las Lajas, Dept. Sacatepéquez, Guatemala, *Standley 88391* from Dept. Retalhuleu, Guatemala, and *Standley 76313* from the vicinity of Jalapa, Guatemala, the leaf blade is relatively broad in the middle and tapers to a somewhat rounded base, best developed in *Standley 76313*. Probably *A. Salviniae* was described from a plant of the latter type, and from such collections as *Elias 1404* and *1477* from Colombia, with an extreme development of the rounded base. Actually, *Standley 58294*, from near Las Lajas at 1200 meters elevation, is not too far from the type locality of *A. Salviniae*, collected on Volcán de Fuego at 1200 meters either in the department of Sacatepéquez or Chimaltenango. Engler cites a collection of *Heyde & Lux 4278* from Naranjo, Dept. Santa Rosa, taken at 1100 meters, and *Standley 78060*, taken near Cuilapilla of the same department at an elevation of 900 meters, has leaves with slightly rounded bases, which begin to approach those of the type. Other collections of *A. crassinervium* were obtained by Standley from the lower slopes of the Volcán de Fuego, the type locality of *A. Salviniae*. When the *A. crassinervium* complex has been studied with greater detail, it may be that *A. Salviniae* will prove distinct.

***Anthurium fraternum*** Schott, Oesterr. Bot. Wochenbl. 293. 1857; Hemsl. Biol. Centr. Amer. Bot. pl. 97. *Gusnay*; *Gusnay de monte*; *Huisnay*.

Moist or wet forests of the Pacific *boca costa*, 1000–1800 meters; endemic; Escuintla; Sacatepéquez (type from Barranco Hondo, base of Volcán de Fuego, *Salvin*); Chimaltenango; Sololá; Suchitepéquez; Quezaltenango; San Marcos; to be expected in Chiapas.

Plants usually epiphytic, sometimes on rocks, acaulescent or nearly so, the caudex almost 1 cm. thick; petioles short-vaginate, equaling or longer than the blade; leaf blades elongate-ovate-cordate, mostly 20–40 cm. long and 12–21 cm. wide, acuminate, deeply cordate at the base, the sinus relatively narrow, the basal

lobes rounded and somewhat incurved, the primary costal nerves about 5-6 on each side, prominent and rather stout, united to form a slender submarginal nerve; peduncles 20-30 cm. long or more; spathe subcoriaceous, subopaque, oblong or subelliptic, 4.5-10 cm. long and 1.5-3.5 cm. wide, caudate-acuminate, usually white or becoming green, clasping at the base; spadix borne on a stipe 5-15 mm. long, 5-8 cm. long and 8 mm. thick, or in fruit as much as 10 cm. long and 2 cm. thick, green or purplish.

**Anthurium montanum** Hemsl. Diag. Pl. Mex. 36. 1879; Biol. Centr. Amer. Bot. *pl.* 98. *Cartucho*.

Common in many regions in moist or wet forest, usually at 1800-2900 meters; endemic; Chiquimula; Sacatepéquez; Chimaltenango (type collected on Volcán de Fuego above Calderas, *Salvin*); Sololá; Quiché; Huehuetenango; Suchitepéquez; Quezaltenango; San Marcos.

Plants acaulescent or nearly so, usually epiphytic, the caudex 1.5 cm. thick, with very short internodes; petioles slender, equaling or longer than the blades; leaf blades subcoriaceous, elongate-cordate, ovate-cordate, or triangular-cordate, 22-35 cm. long, 9-23 cm. wide, acuminate, deeply cordate at the base, the sinus very broad and open, the basal lobes large and rounded, directed downward or slightly outward; peduncles slender, 20-30 cm. long; spathe oblong, pale green or reddish green, 4.5-8.5 cm. long, (1-) 1.5-3 cm. wide, long-acuminate or cuspidate; spadix short-stipitate, 2.5-7 cm. long, 5-8 mm. thick, very obtuse, dark purple.

It is somewhat doubtful whether this species is really distinct from *A. fraternum*. Both are frequent in the same general region, but *A. fraternum* usually occurs at the lower elevations on the slopes of the volcanoes, from 1000-1800 meters, while *A. montanum* is generally encountered at higher altitudes of 1800-2700 meters. They may be variants of a single species ranging from the lower to the higher elevations, or may possibly cross with each other at intermediate altitudes. They are favorite pot plants in gardens and patios of the central uplands and like most epiphytic aroids, they thrive when potted in ordinary soil. They ornament many patios, withstand neglect, resist drouth, and even do well for a long time inside the house in rooms that receive no sunlight.

**Anthurium myosuroides** (HBK.) Endl. Gen. 240. 1837. *Pothos myosuroides* HBK. Nov. Gen. & Sp. 1: 62. *pl.* 18. 1815. *Corazonado*; *Contín*; *Chile de mico* (fide Aguilar).

Moist or wet forest, chiefly on the Pacific slopes of the volcanoes, 1000-1400 meters; Chimaltenango; Quiché; Quezaltenango; San Marcos. Southern Mexico(?); British Honduras to Panama; Colombia.

Plants epiphytic, the caudex very slender and usually much elongate, the internodes often 5-7 cm. long; petioles slender, mostly 10-15 cm. long, the blades

ovate-elliptic or ovate, 12–15 cm. long, 7–8 cm. wide, gradually acuminate or cuspidate-acuminate, rounded at the base and shallowly cordate, the sinus open or almost closed, the primary costal nerves 9–10 on each side, oblique, united to form a conspicuous collective nerve remote from the margin; peduncles slender, 6–15 cm. long; spathe lanceolate or linear-lanceolate, 5–10 cm. long, green, long-attenuate; spadix green, caudiform, short-stipitate, 5–12 cm. long, about 4 mm. thick in anthesis; berries bright red, almost 1 cm. long.

Called "Tietie" in British Honduras.

**Anthurium parvispathum** Hemsl. Biol. Centr. Amer. Bot. 3: 432. 1885. *A. hypoleucum* Standl. Journ. Wash. Acad. Sci. 17: 246. 1927 (type from Santa Rosa, Baja Verapaz, *Tuerckheim II.2214*). *A. brevipetiolatum* Engler ex Krause, Notizbl. Bot. Gart. Berlin 11: 610. 1942 (based on the same collection as *A. hypoleucum*). *Madre de arpon* (fide Aguilar).

Usually on moist or dry, shaded or exposed rocks, about 1500 meters; endemic; Baja Verapaz (type from Santa Rosa, *Salvin & Godman 408*); Quiché.

Plants acaulescent or nearly so, the caudex short and very thick; petioles two-thirds as long as the blades, or sometimes longer, very stout, geniculate just below the base of the blade; leaf blades very thick and fleshy when alive, thick-coriaceous when dried, oblong-lanceolate, 30–60 cm. long, 6–14 cm. wide, usually obtuse and apiculate at the apex but sometimes acute or acuminate, obtuse to subtruncate at the base, deep green above, pale or sometimes whitish beneath, the primary costal nerves 8–9 on each side, remote, united near the margin to form an evident collective nerve, the costa thick and stout, very prominent beneath; peduncles as much as 60 cm. long; spathe oblong or ovate-oblong, usually much shorter than the spadix, 2.5–7 cm. long, 8–12 mm. wide, green or bronze; spadix sessile, as much as 9 cm. long, 6–10 mm. thick in anthesis, in fruit 2 cm. or slightly more in diameter, bronze.

This striking and ornamental plant is abundant and conspicuous on large rocks along the road in the Santa Rosa region, where it often forms large clumps or colonies. It is notable because it grows in full sunlight, which may be intense and hot in this locality, rather than in forest shade, and its very thick and hard leaves, exceedingly resistant to desiccation, fit it well for such a habitat. Its range, as now known, is very limited for a plant of this family.

**Anthurium Pittieri** Engler, Bot. Jahrb. 25: 373. 1898. *A. radicosum* Standl. & Steyermark. Field Mus. Bot. 23: 210. 1947.

Epiphytic in wet forest, 300–350 meters; Alta Verapaz (type of *A. radicosum* from Río Ixvolay, north and northwest of Finca Cubilgüitz to Quebrada Diablo, *Steyermark 44776*). British Honduras (Pueblo Viejo); Costa Rica; Panama.



Plants epiphytic, the caudex slender, 3–10 mm. thick, the internodes 7–12 cm. long, or the terminal ones shorter; cataphylls caducous, thin, brown, obtuse, about 4–5 cm. long and 0.5–1 cm. wide; petioles very slender, 4–7 cm. long, short-vaginate; leaf blades coriaceous alive, very thin and almost membranaceous when dried, narrowly elliptic-oblong to oblong-lanceolate, 11–16 cm. long, 2.5–6 cm. wide, rather abruptly acuminate, acute or short-acuminate at the base, fuscous when dried, slightly paler and brownish beneath, the primary lateral nerves 7–12 on each side, very slender and barely prominulous, inconspicuous, united to form an inconspicuous collective nerve close to the margin; peduncles very slender, 10–15 cm. long; spathe reflexed, pale green, oblong-ovate to linear-lanceolate, 1–2 (up to 7) cm. long, 7–10 mm. wide, obtuse and apiculate to acuminate, clasping at the base; spadix sessile or nearly so or stipitate, slender, in anthesis 4.5–5 cm. long (in fruit up to 8 cm. long), 3–4 mm. thick, not narrowed upward, the flowers rather few.

Because of the great amount of variation in the dimensions of spathe and length of the stipe of the spadix in *A. Pittieri*, it has been found impossible to separate the mass of this variation from *A. radicosum*.

**Anthurium retiferum** Standl. & Steyer. Field Mus. Bot. 23: 211. 1947.

Epiphytic or terrestrial in moist *Liquidambar* forest, 1500–2600 meters; endemic; Huehuetenango (Sierra de los Cuchumatanes; type from Cerro Huitz, between Mimanhuitz and Yulhuitz, *Steyermark* 48621; also on Cerro Negro, 2 miles east of Las Palmas).

Petioles 26–37 cm. long or longer, stout, 6–8 mm. thick, geniculate, 1–1.5 cm. below the base of the blade, the node almost 1 cm. thick; leaf blades subcoriaceous and rigid when dried, somewhat brownish or fulvescent, oblong-elliptic or narrowly oblong-elliptic, 32–42 cm. long, 12–19 cm. wide, acute or subobtuse and apiculate at the apex, rounded or very obtuse at the base, somewhat lustrous, concolorous or nearly so, the primary lateral nerves about 12 on each surface, impressed on the upper surface, slender and salient beneath, the secondary nerves and veins very prominent and conspicuously and laxly reticulate; peduncle 19 cm. long, stout, 4 mm. thick; spathe (a perfect one not seen) reflexed, purple-rose, more than 6.5 cm. long, about 13 mm. wide, cuspidate-acuminate; spadix sessile, cylindric, 9 cm. long, 5 mm. thick, dull purple.

**Anthurium scandens** (Aubl.) Engler in Mart. Fl. Bras. 3, pt. 2: 78. 1878. *Dracontium scandens* Aubl. Pl. Guian. 836. 1775. *A. rigidulum* Schott, Oesterr. Bot. Zeitschr. 8: 180. 1858. *Elote*; *Huisnay de montaña*; *Mazorquillo*; *Cux* (Cobán, Quecchí).

Mostly epiphytic in moist or wet, dense forest, 1800 meters or lower; Alta Verapaz; Izabal; Zacapa; Chiquimula; Jalapa; Escuintla; Sacatepéquez; Chimaltenango; Quiché; Suchitepéquez; Quezaltenango; San Marcos; Huehuetenango. Southern Mexico; British Honduras to Panama; South America.

Plants usually epiphytic, sometimes growing on rocks, rarely, probably as a result of accident, on the ground, the caudex often greatly elongate and scandent or pendent, usually covered by fibrous remains of the cataphylls, the internodes mostly elongate; petioles one-fifth to one-half as long as the blades, narrowly canaliculate; leaf blades rather thin when dried, lance-elliptic, mostly 8–13 cm. long and 2.5–4.5 cm. wide, acute at each end, or rarely obtuse at the apex, the primary costal nerves ascending at an angle of about 45 degrees, united near the margin to form a slender and not very conspicuous marginal nerve; peduncles slender, equaling or as much as 4 times as long as the petioles; spathe green, lanceolate or oblong-lanceolate, cuspidate, somewhat shorter than the spadix, reflexed; spadix pale green, slender, short-stipitate, commonly 2–3 cm. long; berries lavender.

Known in Costa Rica by the names “elotillo,” “elotico,” and “maicillo.” Perhaps the commonest and most widely dispersed of all Central American species of *Anthurium*, often cultivated in gardens or patios. Although normally epiphytic, the plant sometimes grows upon logs or on the ground, where probably it persists after falling from a tree. The stems seldom are closely attached to the trees but more often are free for the greater part of their length, dangling from the trunks or branches. Illustrated, Pflanzenreich IV. 23B: f. 21. Engler refers Guatemalan material to two varieties, *A. scandens* var. *dolosum* (Schott) Engler and *A. scandens* var. *violaceum* (Swartz) Engler, which appear to be varieties of no systematic significance. Some Central American material of this group has been referred to *A. trinerve* Miq., which apparently does not differ essentially from *A. scandens*. Some of the Guatemalan collections could be referred to *A. rigidulum* Schott. This is maintained by Engler as a distinct species but with the curious statement that he does not consider it distinct from *A. scandens*. As a matter of fact, it differs only in having very obtuse rather than acute leaves. The Quecchí name “cux” signifies “ear of corn.” The ripe berries often are eaten, but only in small amounts and casually.

***Anthurium Scherzerianum*** Schott, Oesterr. Bot. Wochenbl. 53. 1857; Regel, Gartenfl. pl. 482. 1865; Fl. Serres pl. 1794, 1795. 1867–68; pl. 2454, 2455. 1880–83. Bot. Mag. pl. 5319. 1862. Type said to have been collected in Guatemala by Scherzer. No wild Guatemalan plants have been seen, and it may be that the type was collected in Costa Rica, where the species is common.

Plants acaulescent or nearly so; petioles equaling or longer than the blades, 10–25 cm. long; blades oblong-elliptic or oblong-lanceolate, 15–20 cm. long, 3–5 cm. wide, acuminate or cuspidate-acuminate, obtuse or rounded at the base, the primary costal nerves numerous and subparallel, spreading, united to form a collective nerve remote from the margin; spathes subcoriaceous, bright red, broadly ovate, short-cuspidate, rounded and clasping at the base, 5–7 cm. long, 4–5 cm. wide;

spadix subsessile, red, spirally twisted, 5–9 cm. long, 4 mm. thick; berries subglobose, bright red.

Called “lengua del diablo” in Costa Rica. This is, in Costa Rica, usually a terrestrial plant, growing in wet forest. It has long been a favorite plant in cultivation in Europe and the United States, where it has been hybridized with other species. Engler lists about 40 forms that are recognized in cultivation, distinguishable by the form of the leaves, color of the inflorescence, etc. In the wild state the inflorescence is always bright red, but some of the cultivated forms have white or yellow spathes. The plant is so showy because of the brilliantly colored inflorescences that it is hard to explain why it has not been collected recently in Guatemala, if it really occurs there, which we consider improbable.

**Anthurium Schlechtendalii** Kunth, Enum. Pl. 3: 75. 1841.

Epiphytic in moist forest, 1200–1500 meters; Huehuetenango (Paso del Boquerón, along Río Trapichillo below La Libertad, *Steyermark* 51171); San Marcos (above Finca El Porvenir, Volcán Tajumulco, *Steyermark* 37078). Southern Mexico; El Salvador; Costa Rica; Panama.

Plants epiphytic or sometimes growing on rocks, rather large and coarse, the caudex very short and thick; petioles subtetragonous, less than one-fourth as long as the blade, usually very short, sometimes as much as 15 cm. long and 1–1.5 cm. thick, with a short node somewhat longer than broad; leaf blades obovate-oblong or oblanceolate-oblong, commonly 50–60 cm. long and 15–20 cm. wide, sometimes smaller or larger, acute or acuminate, coriaceous when dried, gradually narrowed from about the middle to the narrow cuneate base, the costa stout and prominent, sometimes 1 cm. thick at the base, the primary lateral nerves about 14 on each side, stout and prominent, not forming a distinct collective nerve, ascending at an angle of about 45 degrees; peduncles shorter than the leaves, often very short, sometimes 60 cm. long, stout or slender; spathe reflexed, 10–25 cm. long or more, 2 cm. wide near the base, pale green or sometimes tinged with red or purple, long-attenuate, more or less decurrent at the base; spadix 10–25 cm. long, often 1 cm. or more in diameter at the base, attenuate upward, reddish or greenish, in fruit 2 cm. thick.

**Anthurium scolopendrinum** (Ham.) Kunth, Enum. Pl. 3: 68. 1841. *Pothos scolopendrinus* Ham. Prodr. 16. 1825. *A. longipes* Matuda, Soc. Bot. Mex. 14: 23. 1952, not *A. longipes* N. E. Br. Gard. Chron. 18: 297. 1882.

On trees in moist or wet lowland forest, 1200 meters or lower; Izabal; Escuintla. British Honduras (Stann Creek District, *Gentle* 2796, type of *A. longipes* Matuda, not N. E. Brown); Honduras to Costa Rica and Panama; South America.



Plants small, epiphytic, acaulescent or practically so, the caudex very short and rather thick; petioles slender, half as long as the blades or longer; leaf blades lanceolate, lance-oblong, or usually oblanceolate, thin when dried, acuminate, cuneate-attenuate to the base, 11–30 cm. long and 2–5 cm. wide, the costa slender, the primary lateral nerves numerous, oblique, ascending at an angle of about 45 degrees, united to form a slender collective nerve close to the margin; peduncles very slender, equaling or exceeding the leaves; spathe narrowly lanceolate, green, much shorter than the spadix, 2.5–4 cm. long or shorter, subulate-attenuate; spadix very slender, sessile or subsessile, green, sometimes 12 cm. long but usually much shorter, obtuse; berries scarlet, 7 mm. long or less, few and scattered in the fruiting spadix.

Illustrated, Pflanzenreich IV. 23B: f. 25. The characters by which Matuda attempts to separate his *A. longipes*, not *A. longipes* N. E. Brown, from *A. scolopendrinum* do not appear constant, and it seems best to consider the material studied as intergradients within a variable species.

**Anthurium seamayense** Standl. Field Mus. Bot. 22: 4. 1940.

Epiphytic or sometimes terrestrial on limestone in wet forest, 2000 meters or lower; endemic; Alta Verapaz (type from Seraxcaj, *C. J. Wilson 211*); Izabal; Huehuetenango (near Barillas).

Plants acaulescent or nearly so, the caudex usually about 1.5 cm. thick, covered with the fibrous remains of the cataphylls; petioles slender, 20–30 cm. long, geniculate about 1 cm. below the apex; leaf blades oblong-ovate to triangular-hastate or sometimes oblong-cordate or lance-oblong, mostly 20–40 cm. long and 10–20 cm. wide near the base, acuminate or abruptly cuspidate-acuminate, deeply cordate at the base, with a very narrow or rather open sinus, the basal lobes sometimes slightly overlapping, rounded, slightly extended inward or sometimes directed outward, the blade 5-nerved from the base, the primary costal nerves about 8 on each side, united to form a collective nerve close to the margin; peduncles about equaling the petioles, very slender; spathe reflexed, lance-oblong or linear-lanceolate, 4.5–6 cm. long, 1 cm. wide or narrower, rather long-acuminate, brown, often twisted; spadix sessile, chocolate-brown, slender, 4–8 cm. long, 4–5 mm. thick, scarcely attenuate upward.

The rather ample and excellently prepared material of this species recently collected shows considerable variation, and ultimately it may be broken down into two or three species. In the type the leaf blades are ovate-cordate with somewhat incurved basal lobes, while in several collections they are triangular-hastate with the basal lobes directed outward. There are no obvious concomitant characters for separating these forms. The extreme variant is *Steyermark 41956* from Izabal, in which the blades are narrowly lanceolate and about 5.5 cm. wide.

**Anthurium Seleri** Engler, Bot. Jahrb. 25: 459. 1898. *Nalastoc*.

On rocks, 800–1200 meters; endemic; Huehuetenango (type collected on limestone ruins at Chacalá, *Seler* 2643; also between Nentón and Las Palmas).

Plants acaulescent, with a short thick rootstock bearing many coarse brown fibers; petioles stout, half as long as the blades or longer, 10–15 cm. long, or sometimes not more than 6 cm. long; leaf blades coriaceous when dried, yellowish green, pale or glaucescent beneath, narrowly elongate-sagittate, 20–35 cm. long, 5–7 cm. wide at the base, gradually narrowed to the long-attenuate apex, truncate or subcordate at the base, the basal lobes very short and rounded, the primary lateral nerves 8–9 on each side, ascending at a narrow angle, united to form a collective nerve remote from the margin; peduncles half as long as the leaves or longer; spathe clasping at the base, reflexed, dull green, lanceolate, equaling the spadix, 4–7 cm. long, 1.5 cm. wide or narrower, narrowly acuminate; spadix thick, scarcely attenuate upward, 6–7 cm. long; berries oblong-obovoid, 6–7 mm. long.

A well-marked species, related to *A. parvispathum*, easily recognized by the small auricles and the long and very narrow leaves.

**Anthurium silvigaudens** Standl. & Steyer. Field Mus. Bot. 22: 69. 1940. *Xacpec* (Cobán, Quecchí).

Moist or wet forest, 1200–2000 meters; endemic; Alta Verapaz (type collected near Tactic, *Standley* 70505); Huehuetenango (Sierra de los Cuchumatanes).

Plants epiphytic or often terrestrial, sometimes growing on rocks, about a meter high, the short caudex about 1 cm. in diameter; petioles rather stout, about 27 cm. long; leaf blades firmly membranaceous, ovate-cordate, about 35 cm. long and 22 cm. wide, cuspidate-acuminate, deeply (about 11 cm.) cordate at the base, the basal lobes broadly rounded, directed inward, the sinus closed, the basal nerves 7, the lowest one emitting about 8 nerves within the basal lobe, the primary costal nerves about 8 on each side, extending almost or quite to the margin; peduncles short, 7 cm. long; spathe membranaceous and thin when dried, pale green, ovate or lance-ovate, 8–11 cm. long and 3–5 cm. wide, long-acuminate, wavy-margined, broadly clasping and cordate at the base, conspicuously nerved; spadix sessile, dull purplish green, 1 cm. thick.

Although found growing on the ground in the wet Tactic forest, it has also been found as an epiphyte in the Sierra de los Cuchumatanes. It often is grown for ornament in the gardens of Cobán.

**Anthurium subcordatum** Schott, Oesterr. Bot. Zeitschr. 181. 1858. *A. Coibionii* Standl. & Steyer. Field Mus. Bot. 23: 209. 1947 (type collected in Sierra de las Minas, Zacapa, *Steyermark* 42212).

Moist or wet forest, 1100–2500 meters; endemic; Alta Verapaz; Zacapa; Chiquimula; El Progreso; Jalapa; Quiché; Quezaltenango

(type of *A. subcordatum* collected from Las Nubes on the slopes of Volcán de Zunil, *Wendland*); Huehuetenango. El Salvador.

Plants epiphytic or terrestrial, acaulescent or nearly so, the caudex short and thick; petioles slender or stout, 13–35 cm. long; leaf blades chartaceous or pergamentaceous to coriaceous when dried, coriaceous or fleshy when alive, oblong or ovate-oblong, 15–60 cm. long, as much as 25 cm. wide, acute or acuminate, broadly rounded or subcordate at the base and 5–7-nerved, the primary costal nerves 6–10 on each side, united to form a collective nerve remote from the margin; peduncles 12–50 cm. long, slender; spathe ascending to reflexed, oblong-lanceolate or linear-lanceolate, 4–6 cm. long, 2 cm. wide, long-cuspidate, short-decurrent at the base, green; spadix borne on a stipe as much as 3 cm. long in fruit, 5–10 cm. long and 0.5–2 cm. thick, green to dull lavender, becoming red in fruit.

A Guatemalan collection of this species (*Heyde & Lux 3516*) was once listed by Captain Smith as *A. quinquenervium* Kunth, a closely related Colombian species, with which it may eventually have to be united. Engler separates the two on a slight difference in leaf shape and the relative width at the base, and it is suspected that such differences will prove to be unreliable in maintaining the two species apart.

***Anthurium tetragonum* Hook. ex Schott, Prodr. Aroid. 475. 1860.**

Epiphytic or terrestrial, often growing on rocks, 1100 meters or lower; Alta Verapaz; Izabal; Zacapa. Southern Mexico; British Honduras to Panama.

Plants large and coarse, acaulescent or nearly so, the short caudex often 6–8 cm. thick; petioles scarcely one-sixth as long as the blades, commonly 10–20 cm. long or shorter, broadly canaliculate above, flat beneath, the short node thick and about as broad as long or broader; leaf blades coriaceous when dried, broadly obovate to oblanceolate, 60–130 cm. long and 25–50 cm. wide when well developed, rounded and short-cuspidate at the apex, cuneately narrowed to the base, the costa very thick, subpentagonal, usually 1–2 cm. thick at the base, the primary lateral nerves 15–20 on each side, erect-spreading, not united to form a distinct collective nerve, stout and prominent; peduncles terete, usually one-third as long as the blades or shorter, mostly 20–30 cm. long; spathe oblong-lanceolate, long-cuspidate, obliquely decurrent at the base, 15–20 cm. long, 3–4 cm. wide near the base; spadix short-stipitate, 2–3 cm. thick at the base, caudate-attenuate upward, dull green or brownish or dark purplish, 15–25 cm. long; sepals 3 mm. long and one-third as wide; stamens equaling the sepals; ovary subfusiform, half longer than the sepals, attenuate to the apex; berries elongate-turbinate, purplish below, yellowish green toward the apex, 1–1.5 cm. long, 2–3 mm. thick, 1–3-seeded; seed oblong, one-third as long as the berry.

Called “hoja de viento” in Veracruz. This species and *A. crassinervium* are much alike in general appearance, and in herbarium specimens are sometimes difficult to distinguish, but the live plants can be separated easily by the very different petioles, which in *A.*



*tetragonum* have a flat node not carinate dorsally, whereas in *A. crassinervium* the node is dorsally 3-carinate.

**Anthurium titanium** Standl. & Steyerm. Field Mus. Bot. 23: 211. 1947.

Known only from the type, terrestrial in moist or wet forest, San Marcos, Volcán de Tajumulco, above Finca El Porvenir, along Río Cabús, 1300–1500 meters, *Steyermark 37963*.

Plants very large and coarse; petioles 55 cm. long or probably much longer in adult leaves, scarcely vaginate below but slightly dilated, geniculate about 1.5 cm. below the base of the blade, the node 1.5 cm. broad; leaf blades chartaceous or thick-membranaceous when dried, rounded-cordate, 50–120 cm. long, about 40–60 cm. wide or probably even wider, obtuse or rounded at the apex and broadly short-cuspidate, deeply cordate at the base with a very broad and open sinus, entire, 7-nerved from the base, the lowest 2 nerves almost 1 cm. broad at the base, naked on the outer margin for 4–6 cm., emitting 5–6 stout nerves on the lower side, the primary lateral nerves slender, remote, prominent, forming an irregular collective nerve remote from the margin, the veins prominulous, laxly reticulate; peduncle 70 cm. long or more, stout, 2 cm. thick near the base; spathe coriaceous, erect, green suffused with red, lanceolate, 20–26 cm. long, 4.5–6.5 cm. wide near the base, very narrowly attenuate-acuminate, strongly clasping at the base; spadix bronze or brownish green, caudiform, about 19–30 cm. long, 12–18 mm. thick near the base in the dried state, in the living state as much as 2.5–5 cm. thick below, gradually attenuate upward, longer than the spathe, the stout stipe 3–4.5 cm. long, as much as 12 mm. thick.

**Anthurium Tuerckheimii** Engler, Bot. Jahrb. 25: 380. 1898; Pflanzenreich IV. 23B: f. 30, F–L. 1905.

Epiphytic in wet forest, 350–1650 meters; Alta Verapaz (type from Pansamalá, *Tuerckheim 864*); Quezaltenango. British Honduras; Honduras.

Caudex slender, generally much elongate, with often greatly elongate internodes, sometimes 1 cm. thick but usually much more slender; petioles slender, equaling or more often shorter than the blades; leaf blades thin and almost membranaceous when dried, oblong-elliptic or broadly lance-oblong, 18–25 cm. long, 7–10 cm. wide, acuminate or cuspidate-acuminate, broadly rounded at the base and often emarginate or subcordate, the primary costal nerves 8–10 on each side, slender, united to form a slender connective nerve remote from the margin; peduncles very slender, 12–15 cm. long; spathe linear-lanceolate, green, about 5 cm. long and 8 mm. wide, narrowly long-acuminate; spadix subsessile, yellowish green, obtuse, 3.5–6 cm. long, 5–8 mm. thick.

**Anthurium verapazense** Engler, Pflanzenreich IV. 23B: 191. 1905.

Wet forest, epiphytic or terrestrial, sometimes on limestone cliffs, 350 meters or lower; Alta Verapaz (type from Cubilgüitz, *Tuerckheim* 7788); Izabal. British Honduras.

Plants acaulescent or nearly so, the caudex short, about 1.5 cm. thick; petioles about 45 cm. long, vaginate at the base for 6–7 cm., slender; leaf blades subcoriaceous when dried, elongate-sagittate or deltoid-sagittate, about 40–50 cm. long and 15–22 cm. wide but sometimes larger or smaller, the terminal lobes elongate-triangular, apiculate or cuspidate, the basal lobes broadly oblong, rounded at the apex, slightly directed outward, separated by an oblong or sometimes triangular sinus about 7–13 cm. deep, the primary costal nerves 10 or more on each side, slender, united to form a collective nerve close to the margin; peduncles 70 cm. long or shorter, slender; spathe linear-lanceolate, 6–15 cm. long and 4–12 mm. wide or shorter, long-acuminate, green or brownish green; spadix sessile, very slender, in anthesis 12–25 cm. long and 4–8 mm. wide, in fruit sometimes longer and thicker; berries obovoid, 5 mm. long, 4 mm. thick, orange or yellow.

This has been reported from British Honduras as *A. concinnum* Schott.

### CALADIUM Ventenat

*Reference:* Engler, Pflanzenreich IV. 23E: 23. 1920.

Terrestrial plants, arising from tuberous rhizomes; leaves long-petiolate, the blade usually peltate and sagittate, often colored; peduncles usually long and solitary; tube of the spathe convolute, persistent, constricted at the apex, the blade cymbiform, whitish; spadix slightly shorter than the spathe, naked and stipitate at the base, the pistillate lower portion cylindric-conoid or ellipsoid, densely many-flowered, the sterile staminate portion of the spadix subconic, longer than the pistillate, the fertile staminate portion contiguous with the sterile, subclavate, densely flowered, twice as long as the pistillate part; flowers unisexual, naked; staminate flowers with 3–5 stamens, these connate to form a truncate-obpyramidal synandrium sinuately subhexagonal at the apex, the connective thick, the anther cells opening by a short, apical slit; ovary of the pistillate flower usually 2-celled, with several ovules in each cell; stigma depressed-hemispheric, slightly 3–4-sulcate; fruit baccate, several-many-seeded; seeds ovoid.

A genus of about 16 species, all natives of South America, chiefly of Brazil.

**Caladium bicolor** (Ait.) Vent. Descr. Cels. *pl.* 30. 1800. *Arum bicolor* Ait. Hort. Kew. 3: 316. 1789. *Hoja de leche*; *Corazón sangrienta*; *Corazón de Maripá*; *Quequesheque manchado*; *Capa de rey*; *Hoja de adorno*.

Planted commonly in Guatemalan gardens and sometimes more or less naturalized about dwellings or in cemeteries in the moister lowland regions. Native probably of the Amazon Valley.

The plant is easily recognized by its peltate leaves, which always are spotted or striped with white, cream, pink, and other colors. The plants show infinite variety in leaf coloring.

This species is much cultivated for ornament in Europe and the United States because of its striking and beautiful leaves. It is seen frequently also in gardens of the uplands in Guatemala, but does not thrive there so well as in the *tierra caliente*.

### COLOCASIA Schott

*Reference:* Krause, Pflanzenreich IV. 23E: 62. 1920.

Plants terrestrial, usually acaulescent and with tuberous roots; petioles long-vaginate; blades often very large, peltate, ovate-cordate or sagittate-cordate, the posterior lobes rounded; peduncles usually several; tube of the spathe one-fifth to one-half as long as the blade, ovoid or oblong, convolute, persistent and somewhat accrescent in fruit, the blade oblong to lanceolate, finally separating from the tube; spadix shorter than the spathe, the pistillate portion short, the sterile staminate portion short and narrow, the fertile staminate part long and slender, the short apex of the spadix sterile; flowers unisexual, naked; staminate flowers with 3-6 stamens, these connate to form an obpyramidal synandrium dilated, subtruncate, and irregularly polygonous at the apex; anther cells linear or linear-oblong, opening by a very short, apical slit; pistillate flowers 3-4-gynous, the ovary ovoid or oblong, 1-celled, the ovules several or numerous; stigma sessile or nearly so, depressed-capitate, shallowly 3-5-sulcate; berries obconic or oblong, greenish, many-seeded; seeds oblong, with abundant endosperm.

Seven species are known, natives of tropical Asia.

**Colocasia esculenta** (L.) Schott, Melet. 1: 18. 1832. *Arum esculentum* L. Sp. Pl. 965. 1753. *A. Colocasia* L. loc. cit. *C. antiquorum* Schott, Melet. 1: 18. 1832. *Coco* (name used by negroes of North Coast, probably African in origin); *Xacox* (Cobán, Quechichí); *Malanga*; *Papa malanga*; *Elephant-ear*; *Dasheen*.

Planted in various regions of Guatemala for ornament and occasionally in the lowlands for food; more or less naturalized in the North Coast and Alta Verapaz. Native of the East Indies but now grown generally in tropical and subtropical regions.

Plants very variable in size, the thick petiole often a meter long, the blades 50 cm. long or in the ornamental forms even much larger, peltate-ovate, cordate at the base, the anterior lobe broadly ovate, abruptly short-pointed; peduncles much shorter than the petioles; spathes pale yellowish, 15-35 cm. long, the limb lanceolate, 2-5 times as long as the tube.

The ornamental form of this species is not especially common in Central American gardens, but it is seen now and then. In the United States this form is known by the name "elephant-ear," or more often



as "caladium," the latter given because the plant is confused with the genus *Caladium*. The form planted for its rounded, edible tubers is called "dasheen" in English-speaking regions, in the West Indies "malanga" and "yautia." The dasheen is planted for food in lower regions of the north coast and Alta Verapaz, as in the region of Carchá. The tubers are poisonous or at least very dangerous if eaten raw, and must be prepared for the table by long exposure to heat, preferably by boiling first with soda or some other agent that will neutralize and destroy the calcium oxalate crystals. When properly cooked, the tubers are of good flavor and agreeable to eat, with a rather waxy consistency and nutty taste. Attempts have been made to introduce the dasheen into the Gulf Coast area of the United States, but with little success. It does grow and produce abundantly, but the people apparently do not like it as a food. The Maya name is reported from Yucatan as "cucutmacal."

### DIEFFENBACHIA Schott

*Reference:* Engler, Pflanzenreich IV. 23Dc: 36. 1915.

Stout, terrestrial herbs with white or yellow sap, the stems often much elongate and prostrate and rooting, or the plants almost acaulescent, leafy at the apex of the caudex; leaves thick and succulent, long-petiolate, the petiole vaginate to the middle or higher, terete near the apex, the blades oblong, with a thick costa, the primary nerves numerous, parallel with the secondary ones, arcuate near the apex; peduncles shorter than the leaves, the spathe oblong, persistent, the lower portion convolute, the throat open and expanded into a straight or recurved blade; spadix erect, slightly shorter than the spathe, the lower portion densely many-flowered, pistillate, dorsally adnate to the spathe, the upper staminate portion free, subcylindric, densely many-flowered, separated from the pistillate portion by an almost naked portion bearing a few abortive staminate flowers; flowers by abortion unisexual, naked, the staminate with 4-5 stamens, these connate to form a sessile, thickened, truncate, apically 4-5-sulcate synandrium; pistillate flowers with 4-5 claviform staminodia, the pistil 2-3-carpellate, sessile, depressed-ovoid, the thick carpels concrete along one side; ovules solitary in the cells, erect; style none, the stigma 2-3-lobate, concave in the middle, with thick lobes; fruit baccate, crowned by the remains of the stigmas, 1-3-celled; seeds globose or ovoid.

About 25 species are known, generally distributed in tropical America. They grow chiefly in wet, lowland forests. Some species long ago were introduced into cultivation in greenhouses of Europe and the United States, and they are often seen, especially those forms with leaves variegated in white or yellow, as house plants in the United States. The plants with variegated leaves are apparently only variants of the normal green-leaved plants, and often are found in the forest. Six species of *Dieffenbachia* are recorded from Central

America, chiefly in Costa Rica and Panama. The plants are well known to people living in the areas where they grow. When cut, they exhale an unpleasant mephitic odor. The sap is said to be very irritating to the skin, and to cause serious inflammation, but its reputation is exaggerated. An English name for the plants is "dumb cane," and in the United States the name "mother-in-law plant" is sometimes applied to them (this name, rather strangely and probably because of some confusion with *Dieffenbachia*, is now applied more commonly in the United States to *Sansevieria*). In Panama they are called "otó de lagarto," "otó" being the term applied to the cultivated *Xanthosomas*.

Leaves conspicuously spotted with white or cream. . . . . *D. picta*

Leaves green.

Spathe orange at maturity. . . . . *D. Oerstedii*

Spathe green or yellowish green at maturity.

Sheath of the petiole extending almost to the base of the leaf blade. . . *D. Pittieri*

Sheath of the petiole ending far below the blade. . . . . *D. sequina*

***Dieffenbachia Oerstedii* Schott, Oesterr. Bot. Zeitschr. 8: 179. 1858. *Flor de zahino; Colch* (San Marcos); *Cuyanigua*.**

Frequent in wet, lowland forests of both coasts, ascending commonly to 750 meters or rarely to as much as 1900 meters; Izabal; Jutiapa; Santa Rosa; Escuintla; Suchitepéquez; Retalhuleu; San Marcos. Ranging southward to Panama.

Plants usually about a meter high, and with erect stems; petioles 12–20 cm. long, vaginate for two-thirds or more of their length, slender above the sheath, the blades oblong-ovate or broadly oblong, 12–30 cm. long and 6–12 cm. wide, or even larger, very thick when fresh but drying thin, short-cuspidate or acute, rounded or subcordate at the base; peduncles about 7 cm. long, the spathe 15 cm. long and 3–4 cm. wide, subacute, becoming bright orange when mature; spadix slightly shorter than the spathe, naked at the base, the pistillate portion 5 cm. long, the staminate of the same length, the two separated by a sterile portion 2 cm. long; ripe berries scarlet.

Called "hoja de puerco" on the Atlantic coast of Honduras. In favorable localities, especially in the Pacific lowlands, the plants, about a meter high, form extensive and dense colonies.

According to Birdsey, present authority on the Araceae, this and the following species should probably be merged as a single polymorphic species. Since *Dieffenbachia picta* is the earlier available name, it would become the proper name if the two species are united.

**Dieffenbachia picta** (Lodd.) Schott, Oesterr. Bot. Wochenbl. 2: 68. 1852. *Caladium pictum* Lodd. Bot. Cab. pl. 608. 1822. *Quequesque*; *Acacia* (Jutiapa, the latter a rather fantastic name).

Common in cultivation for ornament in Guatemalan gardens; sometimes found also in the lowland forests.

Similar to the ordinary native species, and distinguishable only by the variegated leaves, which are green and variegated or striped with white or cream.

By Engler this is called a "typus polymorphus," and very justly, since there can be no doubt that the "species" consists of variegated forms of various species. These forms have long been cultivated in hothouses of Europe, and are also favorite pot plants in the United States, where they thrive well under conditions of heat and dryness. It is probable that the plants noted in Guatemalan gardens have been brought from the forests, and are mere forms of the local species.

**Dieffenbachia Pittieri** Engl. & Krause, Pflanzenreich IV. 23Dc: 42. 1915.

Wet forest at sea level; Izabal. British Honduras; Atlantic coast of Honduras; Panama.

Plants about a meter high or less, with thick stems as much as 60 cm. tall; petioles mostly 10–13 cm. long, white at the base; leaf blades obliquely oblong, 18–35 cm. long, 6.5–19 cm. wide, acuminate, obtuse or subacute at the base, dark green above, paler beneath; peduncles 4–7 cm. long, the spathe 16–20 cm. long or more, long-acuminate, pale green; staminate portion of the spadix 6–7 cm. long, separated from the fertile portion by a sterile part 3 cm. long.

Called "dumb cane" in British Honduras, "puerco" and "quiscamote" in Honduras.

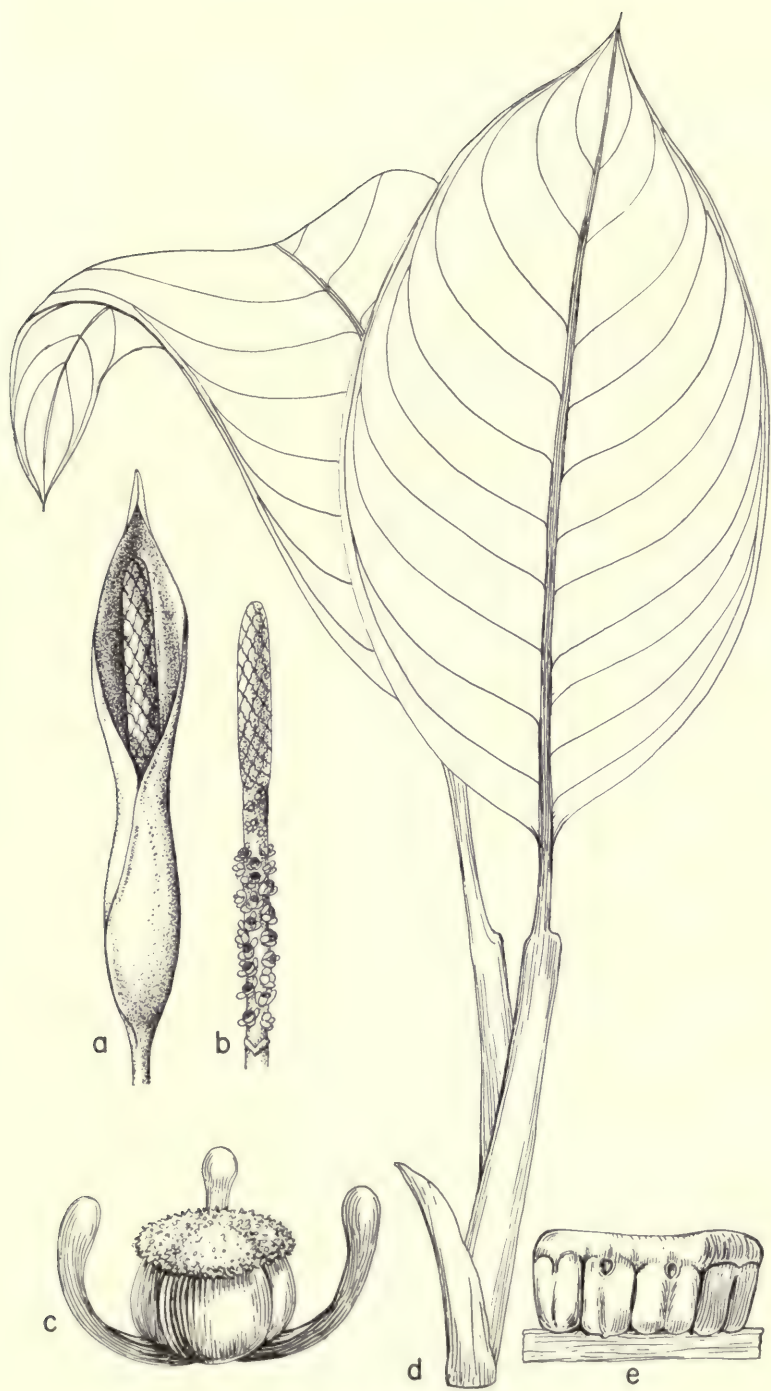
**Dieffenbachia seguina** (L.) Schott, Melet. 1: 20. 1832. *Arum seuginum* L. Sp. Pl. ed. 2. 1371. 1763. *Coche de monte* (fide Morales); *Cuyamiz*; *Hierba de sapo* (fide Aguilar). Figure 55.

Damp or wet forest, chiefly in the lowlands, rarely ascending to 1200 meters; Petén; Alta Verapaz; Santa Rosa; Escuintla; Guatemala; Sacatepéquez; Chimaltenango; Sololá; Suchitepéquez; Retalhuleu; Huehuetenango; San Marcos. Southern Mexico (Chiapas); El Salvador; Honduras to Costa Rica; West Indies; South America.

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FIG. 55. *Dieffenbachia seguina*. a, Flower with spathe and spadix ( $\times \frac{1}{2}$ ). b, Spadix ( $\times \frac{1}{2}$ ). c, Pistillate flower ( $\times 8$ ). d, Leafy apex of shoot ( $\times \frac{1}{2}$ ). e, Staminate flower ( $\times 7$ ).





Plants about a meter high, the caudex usually thick and often decumbent, 4-5 cm. thick; petioles 40 cm. long or less, the sheath half as long or longer, the blades oblong to oblong-ovate, as much as 75 cm. long and 22 cm. wide, dark green above, slightly paler beneath; spathes as much as 27 cm. long, the closed portion 15 cm. long and 3 cm. broad, the upper portion 10 cm. long, with a cusp 2 cm. long; basal portion of the spadix naked, 2 cm. long, the densely flowered pistillate portion 9 cm. long, the staminate portion 9 cm. long, separated from the pistillate by a naked portion 2 cm. long; berries scarlet.

Engler refers the North American material to var. *viridis* Engler of *D. seguina*, which he calls a "polymorphic type," but the various varieties and subvarieties that he recognizes seem to have little systematic importance, and are of concern chiefly to horticulturists. Called "hoja de puerco" in Honduras and "cuyanigua" in El Salvador.

### MONSTERA Adanson

*Reference:* Engler & Krause, Pflanzenreich IV. 23B: 97. 1908.

Scandent epiphytes, usually with thick and greatly elongate stems, these rooting at the nodes; leaves distichous, those of juvenile plants small, ovate or broadly ovate-cordate, short-petiolate, appressed to tree trunks and covering the stem and roots; petiole vaginate to the middle or higher, the blades variable, usually somewhat unequilateral, broadly oblong or oblong-ovate, entire or frequently perforated with large holes, sometimes pinnatifid; peduncles solitary or several at the tips of the branches, the spathe ovate or oblong-ovate, apiculate, cymbiform-convolute, closed after fecundation of the flowers and finally deciduous; spadix sessile, free, subcylindric, densely many-flowered, somewhat shorter than the spathe, the lowest flowers sterile, the others perfect; fertile flowers with 4 stamens, the filaments rather broad, somewhat compressed, abruptly narrowed at the apex into the slender, acuminate connective; anthers 2-celled, the cells oblong, exceeding the connective; ovary obconic-prismatic, 2-celled, the ovules 2 in each cell; style equaling the ovary, truncate at the apex, the stigma depressed-oblong or linear; fruits baccate, crowded, the disklike terminal portion soon freed from the rest of the berry, 1-3-seeded; seeds obovoid or subcordate, subcompressed.

About 27 species are known, widely dispersed in tropical America. The plants are abundant in many of the Guatemalan forests, especially in the more humid parts of the *tierra caliente*. Because of their great size and their striking foliage, they constitute a conspicuous part of the epiphytic vegetation of the taller trees. Most of the plants have distinctive leaves, perforated with large holes, a feature found in only one other Central American group of plants (palms of the genus *Reinhardtia*).

The aerial roots of these plants, as well as those of some other aroids, particularly *Philodendron*, often attain a great length, reaching from the branches of fairly high trees almost or quite to the ground. They are much used in Guatemala for making the so-called

*mimbre* furniture, similar to the light rattan furniture made commonly in the United States. The dried roots, of uniform diameter, or sometimes the fresh ones, are wound tightly and evenly about a wooden frame, forming handsome and durable articles of furniture.

The fruiting spadices of some of the species, particularly *M. deliciosa*, become whitish at maturity and very juicy. They are sweet and of good flavor and often are eaten, but care must be taken to eat only fruits that are thoroughly ripe, since immature ones will cause swelling and irritation of the mouth because of needle-like crystals of calcium oxalate found in the tissues or sap. Because of the unique leaves, these plants long ago were introduced into cultivation in hothouses of Europe and the United States. They have become common house plants in some localities because their thick and fleshy leaves withstand well the drying effects of ordinary steam-heated air.

Leaves, even the adult ones, entire and without perforations, or rarely with a very few, inconspicuous, irregularly scattered perforations.

Leaves (some) with a few small inconspicuous perforations, some without perforations. Leaf blades rounded at the base, 30–40 cm. long, 13–20 cm. wide.

*M. belizensis*

Leaves all without perforations.

Leaf blades obtuse or rounded at the base. . . . . *M. acuminata*

Leaf blades cordate or subcordate at the base or sometimes acute.

Mature leaves mostly 10–15 cm. long, on petioles 3.5 cm. long or shorter; spadices strongly tuberculate because of the much elongate, conic styles. . . . . *M. tuberculata*

Mature leaves about 50 cm. long and 25 cm. wide, on petioles about 25–35 cm. long; spadices not tuberculate, the styles very short.

*M. grandifolia*

Mature leaves perforated or pinnatifid, or both, the perforations usually numerous, sometimes few but then large and conspicuous.

Mature leaves regularly pinnatifid, conspicuously cordate. . . . . *M. deliciosa*

Mature leaves perforated, the margins sometimes irregularly cleft but never regularly pinnatifid, acute to cordate at base.

Perforations of the mature leaves irregularly scattered or rarely arranged in a single series, sometimes irregularly cleft; leaves acute to rounded at base; from sea level to 1100 meters. . . . . *M. pertusa*

Perforations of the mature leaves arranged in 2–4 more or less regular rows along the costa of the blade; leaves rounded to cordate at base; generally occurring between 1300 and 2700 meters. . . . . *M. Friedrichsthali*

***Monstera acuminata*** C. Koch, Ind. Sem. Hort. Berol. App. 4. 1855 (described from plants cultivated in Berlin, obtained somewhere in Central America by Warscewicz). *Sehuanén* (Alta Verapaz).

Epiphytic on trees in moist or wet forest, 1000 meters or lower, most common at or little above sea level; Alta Verapaz; Izabal;



Santa Rosa; Escuintla; Huehuetenango. Costa Rica; reported from Amazonian Brazil.

A small or large vine with thick stems; petioles of adult leaves 7.5–24 cm. long, the blades rather thick, oblong-ovate, mostly 20–38 cm. long and 10–23 cm. wide but somewhat variable in size, very asymmetric, acute or obtuse and usually short-cuspidate, obliquely rounded at the apex; peduncles short, often very short; closed spathe white, oblong, 7–18 cm. long, with an acumen 1 cm. long; spadix oblong-ovoid or oblong, 5–16 cm. long and 1.5–3 cm. thick, or larger; pistils before maturity ovoid, gradually narrowed into the short stigma.

***Monstera belizensis* Lundell, Lloydia 2: 76. 1939.**

Known only from the type, British Honduras, wet lowland forest, Valentín, El Cayo District, *C. L. Lundell 6198*.

A large epiphytic vine; leaves large, the petioles 22–27 cm. long, vaginate to the middle of the upper node, this 1.5–2.5 cm. long; leaf blades thin, obliquely ovate-oblong or lance-oblong, 32–44 cm. long, 13–20 cm. wide, narrowed at the apex or rounded or obtuse and apiculate, rounded and unequal at the base, usually entire, sometimes with 1–2 small perforations remote from the costa, the principal lateral nerves 9–12 on each side; peduncles about 7 cm. long, 8–10 mm. thick; spathe unknown; fruiting spadix sessile, cylindric, 15 cm. long, 3.5 cm. thick; fruits cylindric, 7–9 mm. long (excluding the style), 1–2-seeded; seeds oblong-ellipsoid, slightly compressed laterally, 6.5–9 mm. long; style cylindric, 4–6 mm. long, truncate or slightly concave, the stigma plane.

We have seen no material of this species. Until much more material is available for study, based upon herbarium as well as field research, it is not possible at the present time to be certain of the status of *M. belizensis*, *M. acuminata*, and *M. grandifolia*. It is possible that they represent variations of the same taxon.

***Monstera deliciosa* Liebm. Dansk. Vid. Medd. Forh. 19. 1849–50. *Piñanona*; *Harpón*.**

Moist or wet, mountain forest, 900–1500 meters; San Marcos; Huehuetenango; often grown for ornament in gardens, or as a house plant. Southern Mexico; Costa Rica; Panama.

Usually a large and coarse, epiphytic vine, the stems stout, often greatly elongate, sometimes 6 cm. thick; petioles often a meter long and 2–2.5 cm. thick; blades of the earliest leaves small, cordate, entire, those of the succeeding leaves ovate-cordate, entire, or becoming pinnatifid; adult blades 40–60 cm. long or more, rather thick and somewhat coriaceous, lustrous and bright green above, paler beneath, regularly pinnatifid, the oldest ones also with numerous small perforations close to the costa, in the dried state the ultimate veins conspicuously lineolate-reticulate; peduncle 10–15 cm. long, the spathe coriaceous, broadly ovate and cymbiform, minutely apiculate, 20–25 cm. long, pale yellow; spadix cylindric, 11–20 cm. long, pale yellow or in fruit whitish; stigmas linear; berries 1 cm. long.

Sometimes called "ceriman" in the United States, the origin of that term unknown to the writers. This is the species most often seen in cultivation outside tropical America, and it probably produces better edible fruits than other members of the genus. In Guatemala it has been found growing wild in only four localities. The deeply cordate leaves are quite characteristic of this species.

The plant is often grown for its succulent fruits in tropical or subtropical areas where it is not native. Large plants of this species often are seen as pot or tub plants in the patios and *corredores* of Guatemala. Planted in the ground they often become a pest because of their rapid growth and their tendency to monopolize small spaces allotted to a variety of cultivated plants. The aerial roots are used in Mexico for making strong baskets.

Plants from Costa Rica and Panama belonging to this species have sometimes been misidentified as *M. dilacerata* Koch. So far as known, *M. dilacerata* is a South American species that reaches its northern limit in Panama.

**Monstera Friedrichsthali** Schott, Oesterr. Bot. Wochenbl. 4: 65. 1860 (based on material said to have been collected in Guatemala at "Niquinomo" by Friedrichsthal; this is probably not a Guatemalan locality but is perhaps Nicaragua). *M. siltepecana* Matuda, Rev. Soc. Mex. Hist. Nat. 11: 97. pl. 2, fig. 9. 1950 (type collected at Cascada, Siltepec, Chiapas, Matuda 18642). *Hoja de colador*.

On trees in wet forests, generally between 1300 and 2700 meters; Alta Verapaz; Baja Verapaz; El Progreso; Zacapa; Jalapa; Santa Rosa; Escuintla; Guatemala; Sacatepéquez; Chimaltenango; Retalhuleu; Quezaltenango; San Marcos. Chiapas; El Salvador; Honduras; Costa Rica; Panama.

A small or large vine; petioles 12–47 cm. long; leaf blades obliquely ovate, very asymmetric, one side often almost twice as wide as the other, acute or rather long-acuminate, rounded or cordate at the base, rather thin, the perforations small or large, 2–3-seriate with other small ones between the large ones; peduncles slender, terete, 7.5–10 cm. long, much shorter than the petiole; spathe 11–22 cm. long, 8–17 cm. broad, greenish to whitish without, pink or rose within, deciduous; spadix cylindric, obtuse, 9–13 cm. long, 1.5–2.2 cm. thick; pistils subconic, about 1 cm. long, the sessile stigma linear-oblong; berries truncate.

Called "piñanona" in El Salvador. For an illustration see Pflanzenreich IV. 23B: f. 42. 1905.

It is possible that this species and *M. pertusa* are variations of one taxon. In general, *M. Friedrichsthali* occurs in Guatemala at much higher elevations than *M. pertusa*; *M. pertusa* usually occurs

from sea level to less than 1000 meters, whereas *M. Friedrichsthali* occurs generally between 1300 and 2700 meters. *Monstera siltepecana* Matuda, described from Chiapas, cannot be separated from the many variations of leaf size and perforation manifested by numerous specimens of *M. Friedrichsthali*.

***Monstera grandifolia*** Standl. & Steyerm. Field Mus. Bot. 23: 212. 1947.

Known certainly only from the type, Petén, low forest between Finca Yalpemech and Chinajá, 50–100 meters, *Steyermark 45423*; Izabal(?).

A large coarse epiphytic vine, the stems almost 2 cm. thick; petioles slender, about 25–38 cm. long, narrowly vaginate throughout, the node about 15 mm. long and 8 mm. thick; leaf blades rather thick, oblong-ovate, 47–50 cm. long and 25–33 cm. wide, or sometimes larger and as much as 35 cm. wide, apparently obtuse or rounded at the apex and short-cuspidate, somewhat narrowed below, the base subcordate and somewhat unequal, the costa thick and prominent beneath, the primary lateral nerves coarse and prominent; peduncles about 11 cm. long and 1 cm. thick; spathe unknown; spadix cylindric, sessile, 18 cm. long, 3 cm. thick, the flowers very dense; style very short and broad, truncate or subtruncate.

A collection from Izabal that probably represents the same species has leaf blades that are distinctly acute at the base. In other respects, especially in the size and texture of the leaves and the appearance of the spadix, it is like the type of *M. grandifolia*.

***Monstera pertusa*** (L.) de Vriese, Hort. Spaarn-Bergens. 40. 1839. *Dracontium pertusum* L. Sp. Pl. 968. 1753. *M. longipedunculata* Matuda, Bol. Soc. Bot. Mex. 14: 22–23. fig. 1. 1952. *Harpón*; *Madre de harpón*; *Colcuc* (Quecchí). Figure 56.

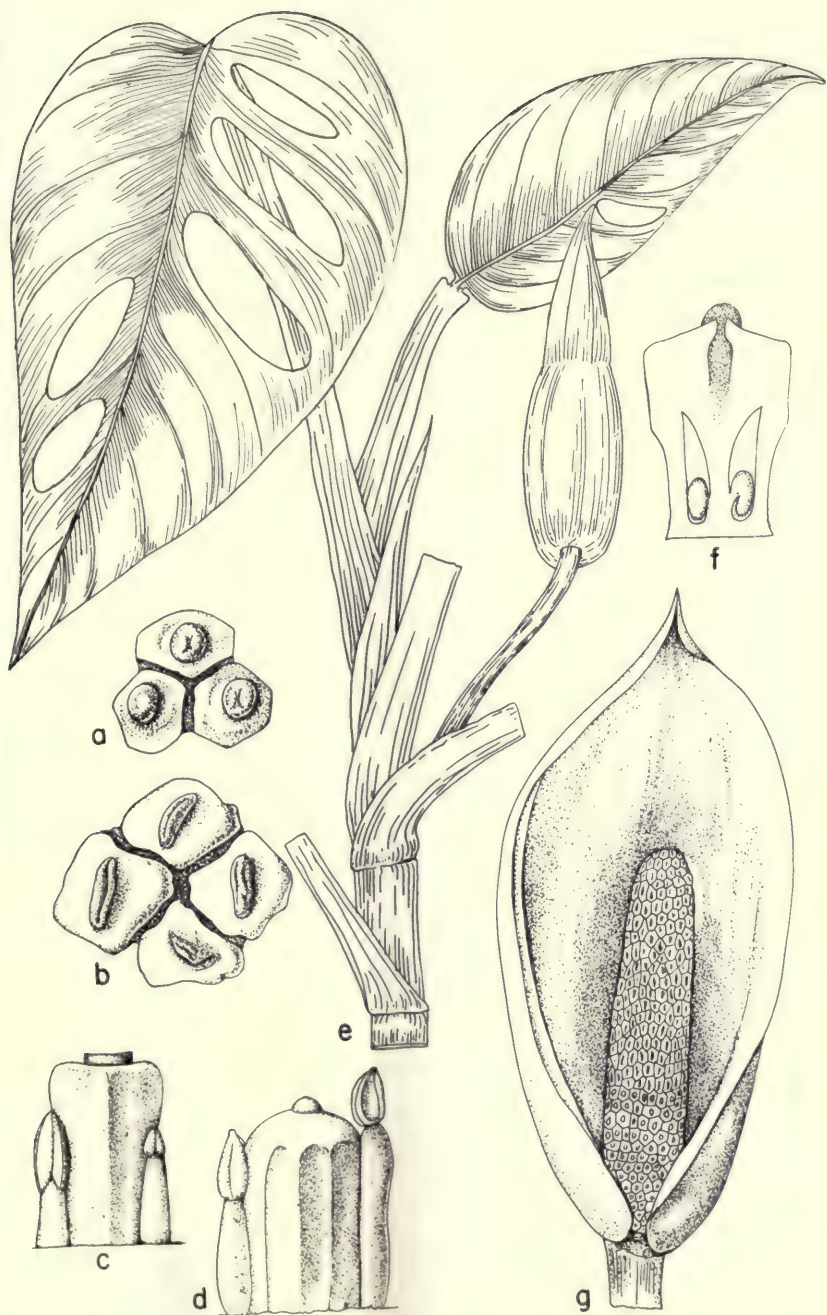
Moist or wet forest, chiefly at the lower altitudes from near sea level to 1100 meters, but sometimes found as high as 1500 meters; Petén; Alta Verapaz; Chiquimula; Santa Rosa; Escuintla; Suchitepéquez; Retalhuleu; Huehuetenango. Honduras to Panama; South America.

A large or small, epiphytic vine, the stems 1–3 cm. thick; blades of juvenile leaves ovate or oblong-ovate or obliquely oblong-elliptic, without perforations;

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FIG. 56. *Monstera pertusa*. a, Portion of surface of fertile part of spadix ( $\times 6$ ). b, Portion of surface of sterile part of spadix ( $\times 6$ ). c, Staminate flower ( $\times 7$ ). d, Pistillate flower from middle part of spadix ( $\times 7$ ). e, Portion of flowering shoot with leaves ( $\times \frac{1}{3}$ ). f, Longitudinal section through pistil ( $\times 3\frac{1}{2}$ ). g, Spadix with spathe ( $\times \frac{1}{2}$ ).





petioles of adult leaves up to 20–38 cm. long, the blades rather thick, broadly ovate-oblong, 30–60 cm. long and 15–26 cm. wide or sometimes larger, somewhat asymmetric, acute or rounded at the base, acute or short-acuminate at the apex, the perforations irregularly scattered or in a single series near the costa, usually large, often unequally and irregularly pinnatifid, the segments 1–5, broadly rhombic-oblong to linear-oblong, truncate, 10–17 cm. long, 2–7 cm. wide; peduncle 5–20 cm. long, the spathe coriaceous, ovate, oblong, or broadly orbicular, acuminate, 9–25 cm. long, 10–14 cm. wide, at first green, becoming whitish or yellowish; spadix cylindric, 6–10 cm. long and 1.5–2.5 cm. thick; pistils subprismatic, whitish to pale yellow, about 4 mm. long, the stigma suborbicular or broadly oblong; berries obovoid, with the style 5–6 mm. long, 4 mm. thick, mostly 1-seeded.

Engler and Krause refer the Central American material of this species to var. *Jacquinii* (Schott) Engler, but this seems to differ in no essential respect from other forms of *M. pertusa*, which these authors describe as a "polymorphic type." There is great variation in the size and number of perforations in the adult foliage, and in the tendency for these perforations to become enlarged; often a leaf splits apart and separates to form two or more irregular segments, giving the leaf an unequally pinnatifid appearance. Upon the latter type of leaf Matuda based his *M. longipedunculata*, which in no way differs from the leaf variations of *M. pertusa*, matched by such Guatemalan collections as *Steyermark 44832* and *45022*, *Standley 53214* and *54465* from Honduras, *Standley 9026* from Nicaragua, and *Austin Smith H175* from Costa Rica. The length of the peduncle in *M. longipedunculata* also falls within extremes of length occurring in *M. pertusa*. Some collections with subincised leaf blades have been misidentified as *M. dilacerata*, a South American species ranging northward to Panama.

The decorticated part of the dried aerial roots of this species is commonly woven into hats, chair-seats, and other articles. The dried roots themselves are often used to make string or rope.

***Monstera tuberculata*** Lundell, *Lloydia* 2: 78. *pl.* 1. 1939.

Epiphytic on trees in wet forest, 300 meters or less; Alta Verapaz; Izabal; Guatemala (?; perhaps in cultivation). Southern Mexico (Oaxaca; Veracruz; Tabasco); British Honduras, the type from Valentín, El Cayo District, *C. L. Lundell 6238*.

A small or large, glabrous vine, the stems sometimes pendent from the branches of trees and forming dense masses; petioles mostly about 3 cm. long, broadly winged for almost their whole length, the wings united below the base of the blade and forming a linear appendage 3.5–4.5 cm. long or shorter; leaf blades ovate or lance-ovate, thick, 10–16 cm. long, 5–9 cm. wide, acute or acuminate, shallowly cordate

at the base and unequal, the nerves all very slender and equal, very numerous; peduncles slender, 5–6.5 cm. long; spathe about 8 cm. long, cuspidate-acuminate; spadix oblong, 5.5–8 cm. long, 2.5–3.5 cm. broad; pistils oblong-ovoid, narrowed into a conical style 4–5 mm. long, the spadix thus appearing densely tuberculate, the stigmas very small for the genus.

Called “hoja de corazón” in Veracruz, and “trepepoyo” in Oaxaca. The epidermis of the older branches is brown and separates in large flakes from the stems in drying.

### MONTRICHARDIA Crueger

*Reference:* Engler, Pflanzenreich IV. 23C: 121. 1911.

Large and coarse, terrestrial plants, the caudices erect, rather densely leafy, simple or sparsely branched; petioles vaginate to the middle or higher, the sheath persistent, clasping at the base, produced at the apex into a ligule; blades sagittate; peduncles shorter than the leaves, usually solitary, rarely geminate; spathes large, thick, convolute below, the limb open, deciduous after anthesis; spadix erect, slightly shorter than the spathe, the pistillate portion cylindric, densely many-flowered, the staminate portion contiguous to the pistillate and much longer, densely many-flowered; flowers unisexual, monoecious, naked; staminate flowers with 3–6 stamens, these distinct, obpyramidal-prismatic, contiguous, truncate at the apex, the filaments almost none; anthers subsessile, 2-celled, the cells oblong, dehiscent by short, apical slits; pistil subprismatic-obovoid, sessile, 1-celled; ovules 1–2 in the cell, ascending, anatropous; fruit large, baccate, spongy, excavate at the apex, radiately costate, 1-seeded; seeds obovoid, the testa smooth and brown.

The genus consists of two species, the other in Bahia, Brazil.

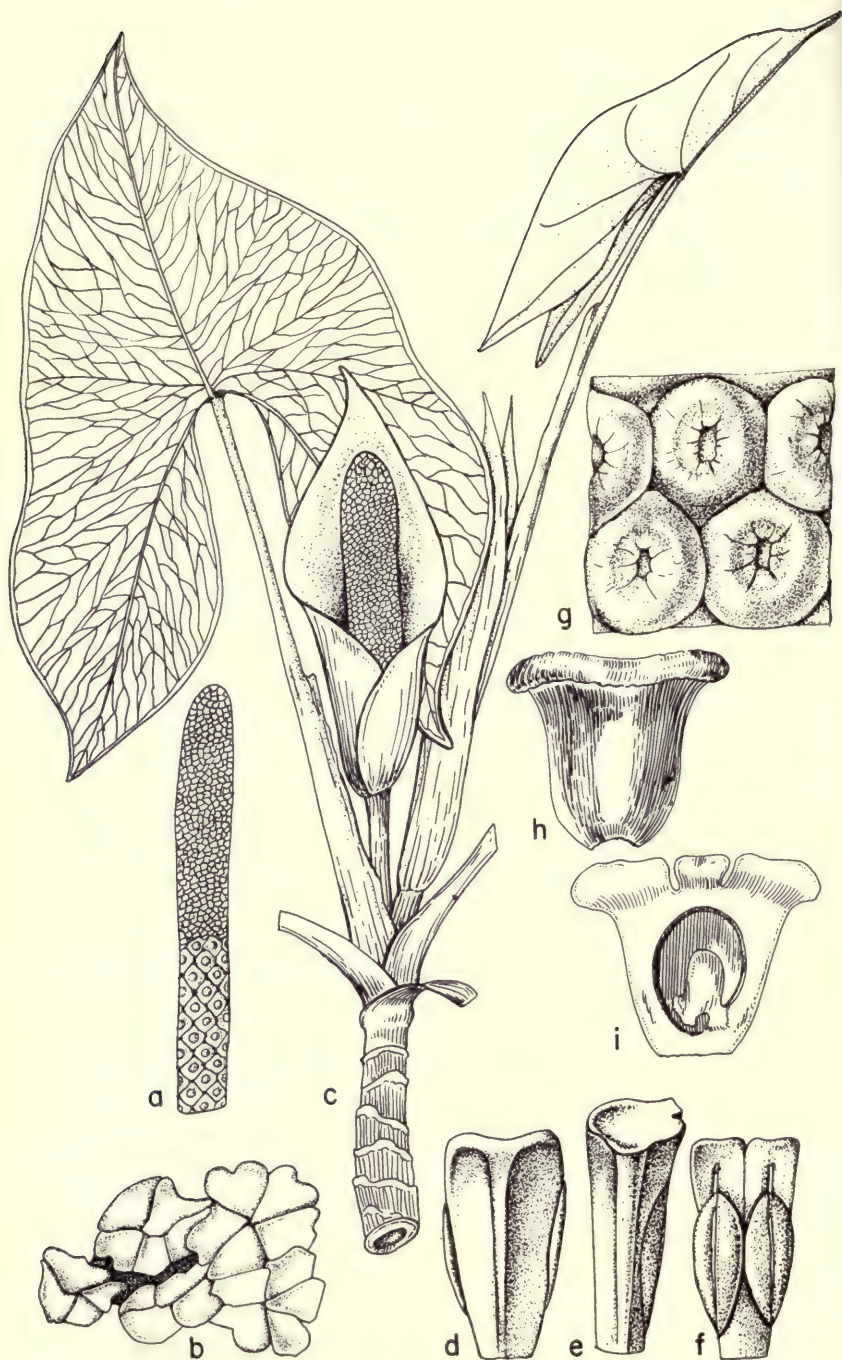
**Montrichardia arborescens** (L.) Schott, Arac. Betreff. 1: 4. 1854. *Arum arborescens* L. Sp. Pl. ed. 2. 371. 1763. *Masica*.

Occasional in tidal swamps of the North Coast, usually growing in shallow water; Izabal. British Honduras to Panama, Lesser Antilles, Venezuela, and the Guianas. Figure 57.

Caudex as much as 3 meters high but usually lower, 1.5–2 cm. thick or toward the base much thicker, the internodes about 1 cm. long, smooth or slightly aculeolate; petioles 20–30 cm. long, the sheath extending above the middle; blades 20–30 cm. long or often much larger, deeply sagittate, the basal lobes retrorse, triangular-lanceolate, acuminate, the anterior lobe triangular or ovate-triangular, short-cuspidate or obtuse, the primary costal nerves 3–4 on each side, united to form an obscure collective nerve close to the margin; peduncles half as long as the spathe; spathe oblong-ovate, cuspidate, 10–13 cm. long, 6–7 cm. wide, white; spadix very thick and stout, the staminate portion 7 cm. long, the pistillate part one-third as long; berries 1–1.5 cm. in diameter.

The plant is a characteristic one on muddy banks of the coastal swamps. The massive stems often are supported by prop roots.





The large white spathes are conspicuous and handsome, suggesting those of the cultivated calla (*Zantedeschia*).

### PHILODENDRON Schott

*Reference:* Engler & Krause, Pflanzenreich IV. 23Db. 1913.

Scandent, often very large and climbing over tall trees, often emitting long aerial roots, the internodes mostly elongate, the young plants with long-vaginate leaves; sheaths often produced at the apex into a ligule, the petiole terete or canaliculate; blades herbaceous or coriaceous (in the dried state), various in form, entire or often lobate or parted, the lateral nerves all parallel, equal or the primary ones slightly stouter; peduncles usually short, the spathe fleshy, white, green, or colored, the tube convolute, cylindric or ventricose, persistent after anthesis and surrounding the spadix, its blade cymbiform and ovate, oblong, or lanceolate, usually erect, reconvolute after fecundation; spadix erect, about equaling the spathe, sessile or short-stipitate, the pistillate portion densely many-flowered, cylindric, fleshy in fruit, the staminate portion sterile below, fertile above, withering and recurved in fruit; flowers unisexual, naked, the staminate with 2-6 stamens, these obpyramidal-prismatic, truncate at the apex, the connective of the anther thick, the anthers extrorse, oblong or linear, emarginate at the base; ovary of the pistillate flower ovoid or obovoid, 2-several-celled, the ovules 1 to several; stigma sessile, hemispheric or lobulate; fruits baccate, crowded, 1-several-seeded; seeds ovoid-oblong or ellipsoid, straight.

One of the largest genera of the family, with about 225 species, widely distributed in tropical America. The species are rather numerous in Guatemala, and the plants often abundant, especially at lower elevations in wet forests. Most of the plants are large vines, and they are often highly ornamental because of their large and handsome leaves. Even the inflorescences of some species are showy and rather attractive.

Leaf blades shallowly or deeply lobed or parted.

Blades 3-parted.

Ovules several in each cell of the ovary ..... *P. anisotomum*

Ovules solitary in the cells. .... *P. tripartitum*

Blades pinnatifid, with more than 3 lobes.

Leaf blades triangular-sagittate in outline, bipinnately parted or bipinnatisect, most of the divisions lobed or parted ..... *P. Warscewiczii*

Leaf blades cordate-ovate in outline, pinnately parted, most of the divisions usually long and simple ..... *P. radiatum*

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FIG. 57. *Montrichardia arborescens*. a, Spadix ( $\times \frac{1}{2}$ ). b, Portion of surface of staminate spadix ( $\times 5$ ). c, Apex of flowering shoot with leaves ( $\times \frac{1}{2}$ ). d, Stamen, ventral view ( $\times 10$ ). e, Stamen, lateral view ( $\times 10$ ). f, Stamen, dorsal view ( $\times 10$ ). g, Portion of surface of pistillate spadix ( $\times 4$ ). h, Pistillate flower, lateral view ( $\times 6$ ). i, Pistillate flower with longitudinal section through ovary ( $\times 6$ ).

Leaf blades entire.

Blades obtuse or rounded at the base, or merely subcordate.

Sheath ending 3–10 cm. below base of blade; blades shallowly cordate or subcordate at base. . . . . *P. Popenoei*

Sheath extending quite to base of blade or ending within 3.2 cm. of base of blade; blades attenuate to rounded at the base.

Lateral pairs of most prominent primary nerves on lower leaf surface generally 5–9 (rarely 10); sheath of petiole extending almost or quite to base of blade, its adnate portion on the petiole ending 1–6 mm. below junction with leaf blade; spathe 8–11 cm. long; spadix 8.5–10 cm. long.

*P. guttiferum*

Lateral pairs of most prominent primary nerves on lower leaf surface more numerous and conspicuous, usually 10–16; adnate portion of sheath of petiole ending usually 10–32 mm. below junction with leaf blade (rarely ending 5 mm. below junction); spathe usually 12–15 cm. long; spadix usually 11–15 cm. (rarely 8.5) long. . . . . *P. guatemalense*

Blades deeply cordate or sagittate at the base.

Leaf blades sagittate, the basal lobes somewhat divaricate and narrowed at the apex. . . . . *P. sagittifolium*

Leaf blades ovate-cordate or rounded-cordate, the basal lobes not divaricate, broadly rounded at the apex.

Lateral nerves of the leaves above the basal ones usually 2–3 on each side; basal sinus of the leaf acute, very narrow; cells of ovary many-ovulate.

*P. hederaceum*

Lateral nerves of the leaves above the basal ones usually 5–7 on each side; basal sinus of the leaf broad and open; cells of ovary 1–3-ovulate.

Pistil elongated, the style much longer and narrower than the ovary; cells of ovary 2–3-ovulate; peduncle 3.5–5 cm. long. . . . . *P. Hoffmannii*

Pistil only slightly longer than broad, the style about as broad as the ovary; cells of ovary 1-ovulate; peduncle 6–20 cm. long. . . . *P. Smithii*

**Philodendron anisotomum** Schott, Oesterr. Bot. Zeitschr. 179. 1858. *P. affine* Hemsl. Diag. Pl. Mex. 37. 1878 (type from Barranco Hondo, Volcán de Fuego, Sacatepéquez, *Salvin*). *Cabeza de toro*; *Conti*; *Contín*; *Choboc* (Cobán, Queciché).

Moist or wet forest, 1500 meters or lower; Chiquimula; Jalapa; Jutiapa; Santa Rosa; Escuintla; Sacatepéquez; Suchitepéquez; Retalhuleu; Quezaltenango; San Marcos. Southern Mexico.

A small or large vine; petiole slender, terete, 15–40 cm. long or more, attenuate upward; leaf blades subcoriaceous, 3-parted almost to the broadly cordate base, the segments separated by rounded sinuses, unequal, the central one much wider than the lateral ones, the midlobe oblong-lanceolate, acuminate, 12–24 cm. long and 4–10 cm. wide or larger, the lateral lobes oblique and somewhat incurved-falcate, the primary lateral nerves of the midlobe 4–5 on each side, ascending; peduncles stout, 5–8 cm. long or more; spathe green or bluish green outside, sometimes tinged with pink, dark red within, oblong, constricted below the middle, 6–12 cm. long; spadix pale yellowish, short-stipitate, cylindric, obtuse, 5–9 cm. long, 1–1.5 cm. thick; pistils cylindric, 4–6 mm. long, 5–6-celled, the cells 4–5-ovulate.



Called "anona conte" and "anona de conde" in El Salvador.

This handsome plant is frequent at many places along the Pacific foothills and ascends rather high in the mountains where there is sufficient moisture. It is much planted for ornamental purposes in Guatemala, especially as a pot plant in patios. The local name "cabeza de toro" ("bull-head") is an apt one, for the pendent leaf blades, with a broad central division and a narrow curved one on each side, do suggest the head and horns of a bull.

**Philodendron guatemalense** Engler, Bot. Jahrb. 26: 514. 1899. *P. belizense* Standl. Field Mus. Bot. 11: 129. 1932 (type from base of Cockscomb Mountains, British Honduras, *W. A. Schipp* 545). *P. Rojasianum* Standl. & Steyermark. Field Mus. Bot. 23: 3. 1943 (type from Finca Pirineos, lower southern slopes of Volcán de Santa María, Quezaltenango, *Steyermark* 33244).

Epiphytic or growing upon rocks, usually in wet forest, ascending from 120 meters to about 1800 meters; Alta Verapaz; Izabal; Santa Rosa; Escuintla (type from Torolá, *J. D. Smith* 2240); Sacatepéquez; Chimaltenango; Sololá; Suchitepéquez; Retalhuleu; Quezaltenango; San Marcos. Chiapas; British Honduras.

Usually a large vine, the internodes terete and stout; petiole 10–30 cm. long, with a conspicuous, broad, green sheath up to 1 cm. broad, this ending usually 1–3.2 cm. below the base of the blade, sometimes produced at the apex into a broad green ligule as much as 2.5 cm. long; blades thin (when dried), oblong-ovate or elliptic-oblong, 15–38 cm. long and 8–17 cm. wide or even larger, obtuse or rounded at the cuspidate-acuminate apex, rounded or obtuse to very shallowly cordate at the base, the primary nerves 10–16 on each side, much stouter than the secondary ones, divergent at a wide angle; peduncles stout, 1.5–2 cm. long; spathe whitish, green, or yellowish green, about 12–15 cm. long and 2 cm. thick, the blade lanceolate, attenuate; spadix green, slender, slightly attenuate upward, obtuse, short-stipitate, usually 11–15 (rarely 8.5) cm. long, shorter than the spathe; pistils 3–5-celled, many-ovulate; stamens 2–3.

A common and rather handsome plant, sometimes growing on rocks. Illustrated by Engler, *Pflanzenreich* IV. 23Db: f. 5. 1913. Called "anona conte" in El Salvador.

In Guatemala this species ascends to 1800 meters on the lower slopes of some of the volcanoes, and in the mountains of Alta Verapaz to elevations of 1600 meters. A related species, *P. guttiferum*, is found at lower elevations.

The character of the prolonged free ligule of the sheath, used to distinguish *P. Rojasianum*, has been found to be a variable one. *Steyermark* 47918 from Volcán de Atitlán has the ligule well devel-

oped, as in *P. Rojasianum*, while other collections referred to *P. guatemalense* have the ligule much less developed at the free apical end.

***Philodendron guttiferum*** Kunth, Enum. 3: 51. 1844. *P. Talamancae* Engler, Bot. Jahr. 26: 511. 1899 (type from Talamanca, Costa Rica, Pittier & Durand 9223). *P. calderense* Krause in Engler & Krause, Pflanzenreich IV. 23Db: 8. 1913 (type from El Boquete, Panama, Pittier 3150). *P. linearipetiolatum* Matuda, Madroño 10: 49. fig. 1, a-b. 1949 (type from Finca Corcega, Chiapas, Mexico, Matuda 17781). Conte.

Epiphytic in wet forest, ascending from sea level to about 600 meters; Alta Verapaz; Izabal; Huehuetenango. Southern Mexico (Oaxaca, Vera Cruz, Chiapas); Honduras; Nicaragua; Costa Rica; Panama; South America.

A small or large, epiphytic vine, the branches stout, terete, with elongate or short internodes, the uppermost short, 8–10 mm. thick; petioles mostly 5–17 cm. long, varying from one-fourth the length of the blade to equaling the blade in length, the broad green sheath ending 1–6 mm. below the junction with the leaf blade or extending to the very base of the blade and conspicuously produced beyond it as a ligule; leaf blades firm-membranaceous, thin, but often rather stiff, oblong, ovate-oblong, oblong-lanceolate, or rarely lanceolate, 10–20 cm. long and 1.5–10 cm. wide, abruptly short-acuminate or cuspidate-acuminate, obtuse and somewhat oblique at the base, the primary lateral nerves 5–10 on each side, inconspicuous but stouter than the secondary ones; peduncles terete, stout, mostly 2 cm. long or less to subsessile; spathe greenish- or creamy-white, ovoid- or elliptic-oblong, short-acuminate, convolute, 8–15 cm. long, 5 cm. wide, 2–3 cm. in diameter below; spadix short-stipitate or subsessile, the pistillate portion in anthesis about 4.5 cm. long, almost 2 cm. thick, in fruit 10 cm. long and 4 cm. thick, the staminate portion of equal length to twice as long, attenuate upward; pistil prismatic, 3–4 mm. long; berries oblong, 6–7 mm. long, 4 mm. thick, 4-celled, the cells mostly 4-seriate, 2–3-seeded.

This species is found in only a few departments of Guatemala, occurring at low elevations. Called “chupa-pito” in Chiapas.

It has not been possible to separate *P. guttiferum* from *P. calderense*, *P. Talamancae*, and *P. linearipetiolatum*. In the Pflanzenreich *P. guttiferum* is separated on the basis of its short petioles, half as long as the blades, but the illustration in that work (fig. 3, A–G) shows petioles scarcely if at all shorter, proportionately, than those of *P. calderense*. The extent to which the sheath reaches the base of the blade and the degree to which the lobes of the sheath are produced beyond the insertion have been found to be variable characters, as have also the relative proportions of the leaf blade and petiole length, and cannot be depended upon for specific segregation. It is probable that after an intensive monographic study has been made

within this group, many more names considered as distinct species by Engler and Krause will have to be reduced to synonymy under *P. guttiferum*, *P. lingulatum*, and other species. Matuda himself (Las Araceas Mexicanas, Anal. Inst. Biol. Mex. 25: 146. 1954) reduces his *P. linearipetiolatum* to synonymy under *P. seguine* Schott. The latter taxon Dr. Birdsey considers distinct from the form generally treated as *P. guttiferum*.

In describing *P. linearipetiolatum*, Matuda was misled by the winged nature of the sheath of the petiole and the relatively narrow leaf blades. The breadth and shape of the leaf blade vary on the same plant from juvenile to mature leaves. This can be verified by a study of preserved collections in the Chicago Natural History Museum Herbarium. Such type of variation may be found in *Steyermark* 41771 from the Río Tameja of the Department of Izabal, and *Steyermark* 41733 from the Río Bonita in the same region. The latter collection and *Steyermark* 49277 from the Río Ixcán in the Department of Huehuetenango have blades at least as narrow as or narrower than those of the type collection of *P. linearipetiolatum*. Moreover, in deciding that the petiole in *P. linearipetiolatum* was winged in the natural state, while *P. calderense* was not, Matuda confused his collections of the latter species with *P. guatemalense*. He believed that the "sheathed petiole of *P. calderense* in its natural state is so completely closed that it seems like a cylindrical tube, and this is the reason that the plant is called *chupa-pito* by the natives" (Madroño 10: 50. 1949). However, the collections of Matuda (16697, 17707, and 17667) bearing the local name of "*chupa-pito*" are not *P. calderense*, but actually *P. guatemalense*. The manner of pressing and the rapidity of drying undoubtedly affect the appearance of the winged petiole, so that the wing appears more pronounced and better developed when the petiole is pressed out flatly and evenly. The variation of the wingedness of the petiole on the same plant may be seen by referring to *Steyermark* 41771, discussed above, and the comparative narrowness of the wing is shown to good advantage in *Steyermark* 41733. Although Matuda believed that the sheathed petiole was completely closed in the natural state of *P. calderense* (actually *P. guatemalense*), an examination of ample material from Guatemala of *P. guatemalense* reveals many collections with narrow, seemingly closed types of sheathed petioles as well as expanded broadly winged types (the latter to be noted in *Steyermark* 33244, the type collection of *P. Rojasianum*, *Steyermark* 37448, *Steyermark* 47918, *Standley* 90818, and several others).



**Philodendron hederaceum** (Jacq.) Schott, Melet. 1: 19. 1832. *Arum hederaceum* Willd. Sp. Pl. 4: 486. 1805. *P. cordatum* Hort., not *P. cordatum* (Vell.) Kunth. *P. scandens* C. Koch & H. Sello, Ind. Sem. Hort. Berol. App. 14. 1853. *P. oxycardium* Schott, Syn. Aroid. 82. 1856. *P. Miduhoi* Matuda, Rev. Soc. Mex. Hist. Nat. 11: 95. 1950.

Wet forest of the Pacific coast, at or little above sea level; Santa Rosa; Suchitepéquez; Retalhuleu. Southern Mexico to West Indies and northern South America. Venezuela.

A large or small vine, growing over trees or rocks, the internodes of the stems 8–15 cm. long, 1 cm. thick or less; petiole semiterete, 10–18 cm. long or more; blades thick when dried, broadly cordate-ovate, mostly 20–30 cm. long and 16–20 cm. wide but sometimes considerably larger, abruptly cuspidate, deeply cordate at the base, with a narrow acute sinus, the basal lobes broadly rounded, semiobicular, the costa stout, with 3 basal and 2–3 costal nerves on each side, these much stouter than the secondary and tertiary nerves, divergent at a wide angle; peduncles 2–3 cm. long or sometimes much longer, stout; spathes green or purplish, the tube 5–6 cm. long, 3 cm. broad, the limb of about the same length; spadix cylindric, short-stipitate, the pistillate part 4–5 cm. long, 1.5 cm. thick, the staminate portion 6–7 cm. long; pistils oblong, 5–6-celled.

Illustrated by Engler, Pflanzenreich IV. 23Db: f. 19, A–G. 1913. The Maya name is reported from Yucatan as “acalcumche.” The Guatemalan specimens are all sterile and their determination therefore is uncertain. Some of the sterile material identified as *P. Hoffmannii* may belong here.

According to Dr. Birdsey, this is the common *Philodendron* sold in florists' shops and department stores everywhere, which long has passed under the name *P. oxycardium* and *P. cordatum*, although the latter name has been misapplied.

**Philodendron Hoffmannii** Schott, Oesterr. Bot. Zeitschr. 178. 1858. *P. apocarpum* Matuda, Madroño 10: 171. 1950 (type from Chiapas, Mexico). *Cola de coyote* (Jutiapa); *Chile de chucho*; *Guacamayo*; *Quequesque de coyote*. Figure 58.

Epiphytic in moist or wet forest or sometimes on rocks or terrestrial, 800–2500 meters; Alta Verapaz; Zacapa; Chiquimula; Jutiapa; Jalapa; Santa Rosa; Escuintla; Guatemala; Chimaltenango; Retalhuleu; Quezaltenango; San Marcos. San Luis Potosí to Yucatan and Chiapas; British Honduras; Honduras; El Salvador; Costa Rica; Panama.

A small or large vine; internodes of the stem about 1 cm. thick; petioles subterete, 10–20 cm. long; leaf blades subcoriaceous, but thin when dried, ovate-

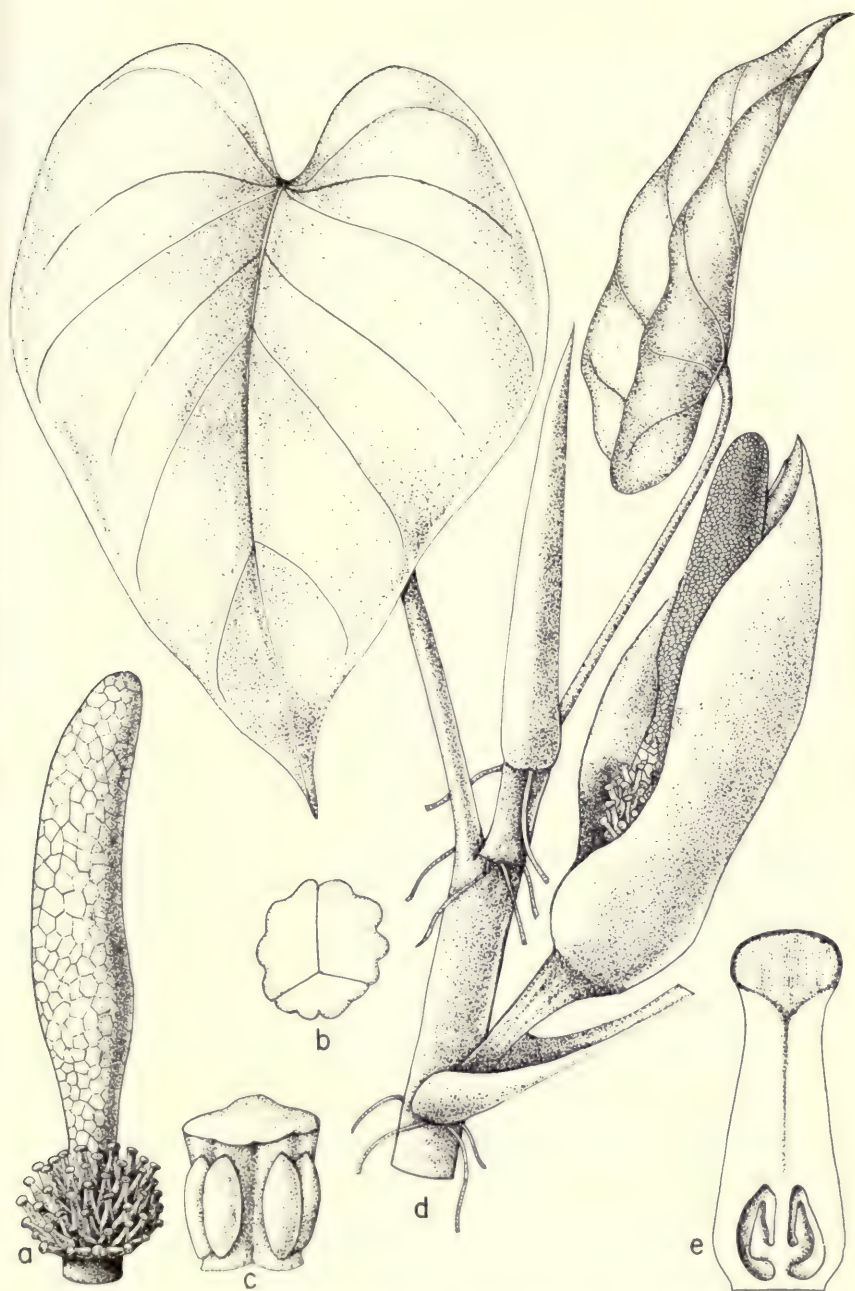


FIG. 58. *Philodendron Hoffmannii*. a, Spadix ( $\times \frac{3}{8}$ ). b, Staminate flower viewed from above ( $\times 12$ ). c, Staminate flower ( $\times 12$ ). d, Part of flowering branch and leafy stem ( $\times \frac{1}{2}$ ). e, Pistillate flower ( $\times 7\frac{1}{2}$ ).

triangular, ovate-cordate or rounded-cordate, 12–24 cm. long, 10–20 cm. wide, cuspidate-acuminate, deeply cordate at the base, with a wide open sinus, the basal lobes rounded, the primary lateral nerves 3–6 on each side, divergent at a wide angle, much stouter than the secondary and tertiary ones; peduncles short or usually elongate, 3.5–5 cm. long, stout; tube of the spathe ovoid, 3–5 cm. or more long, yellowish green outside, creamy white within, the limb ovate to oblong, cuspidate-acuminate, 4–15 cm. long; spadix sessile, the pistillate portion 1.5–6 cm. long, 2–4 cm. thick, the staminate 4–10 cm. long and 2–2.5 cm. thick; pistils 4–12 mm. long, 1–1.5 mm. thick, 3–4-celled, the ovules 2–3 in each cell, inserted near the base of the cell; stamens usually 4; berries ovoid, 7–8 mm. long, 3 mm. thick.

Much of the Guatemalan material has been previously misidentified as *P. Pittieri* Engler, which, according to present studies of Dr. Birdsey, is an anomalous species, not found in Guatemala.

*Philodendron apocarpum* Matuda cannot be differentiated from *P. Hoffmannii*. Matuda used characters of longer ovaries, longer petioles and peduncles, fewer primary nerves of the leaf blades, and altitudinal differences in habitat in separating his species. These differences break down upon examination of numerous specimens, the more mature flowers, for example, showing longer ovaries. In fact, the character of an elongated pistil, narrowly contracted to the stigma, was originally used by Engler in setting aside a separate section, *Macrogynium*, for *P. Hoffmannii*.

Called “anona conte” in El Salvador and “hoja de sereno” in Honduras.

*Philodendron lacerum* (Jacq.) Schott has been reported doubtfully from Petén, but the report is probably based upon a misidentification of *P. radiatum*, according to Dr. Birdsey. *P. Lundellii* Bartlett has been listed as a Petén species, but the name is a *nomen nudum*, as no description has been published.

**Philodendron Popenoei** Standl. & Steyerf. in Yuncker, Field Mus. Bot. 9: 264. 1940.

Wet forest of the North Coast, at or little above sea level; Izabal (Entre Ríos). Also on the Atlantic coast of Honduras, whence described.

A large vine, climbing over trees, the internodes rather stout, elongate; petiole slender, 12–22 cm. long, narrowly winged by the sheath, this ending 3–10 cm. below the base of the blade; blades thin when dried, ovate or oblong-ovate, 16–33 cm. long, 13–20 cm. wide, short-apiculate, shallowly cordate or subcordate at the base, the basal lobes broadly rounded, short, the primary lateral nerves 8–9 on each side, slender, but conspicuously stouter than the others, the secondary and tertiary ones very numerous, equal, all divergent at a broad, often almost right, angle; peduncles



stout, 3.5–4 cm. long; spathe green, 9–12 cm. long, 2 cm. thick, the blade broad, acuminate; spadix white, stipitate, the pistillate portion about 3 cm. long and 1 cm. thick, the staminate part 5 cm. long; pistils columnar, scarcely more than 2 mm. long.

Called “hoja de sereno” in Honduras.

**Philodendron radiatum** Schott, Oesterr. Bot. Wochenbl. 3: 378. 1853. *Mano de león*; *Uxb* (Alta Verapaz).

Wet forest, ascending to 2000 meters or perhaps even higher; Alta Verapaz; Izabal; Santa Rosa; Escuintla; Suchitepéquez; Retalhuleu; Quezaltenango; San Marcos. Central and southern Mexico to Panama.

A large or small vine, the stems thick, with short internodes; petiole pale green, subterete, 40–65 cm. long or more; blades thin-coriaceous when dried, the primary ones ovate-oblong, subentire, the next ones more or less incised or shallowly lobate, the adult blades pinnate-parted, ovate in outline, 35–50 cm. long and 30–35 cm. wide, or often much larger, the segments 5–10 on each side, linear-lanceolate, acuminate, the lower ones often more or less lobulate, the middle ones 2–3 cm. wide; peduncles stout, 4–6 cm. long; spathes cymbiform, bronze- or whitish-green, pale purple within, the tube ovoid, the blade oblong, apiculate, about equaling the tube; spadix 12–18 cm. long, the staminate portion slightly longer than the pistillate, attenuate upward; pistils pale green, oblong, 2–3 mm. long, 8–10-celled, the cells chiefly 4–5-ovulate; stamens 4–6; berries oblong, 6–7 mm. long.

Illustrated, Field Mus. Bot. 10: *pl.* 15. 1931; Pflanzenreich IV. 23Db: *f.* 40. 1913. Called “hoja de peche” in El Salvador, “conte septina” in Chiapas. A striking plant because of the large and distinctive leaves and densely draping tree trunks. It often is cultivated in patios of the central region, and it or a closely related species often is seen as a house plant in the United States. The leaves are much used in Guatemala as decorations on altars and elsewhere. The juvenile leaves are very unlike the adult ones, being broadly cordate-ovate, the earliest ones nearly or quite entire, the succeeding ones undulate or very shallowly and obscurely lobate.

**Philodendron sagittifolium** Liebm. Vid. Medd. Naturh. For. Kjöbenhavn 1850: 17. 1850.

Epiphytic in moist or wet forest of the Occidente, 1200–1500 meters; Quezaltenango; San Marcos. Southern Mexico.

A large or small, coarse vine, the internodes of the stems more or less elongate, 1–3 cm. thick; cataphylls linear-lanceolate; petioles slender or stout, often 40 cm. long or more, usually short-vaginate; leaf blades oblong-sagittate, rather thick and when dry somewhat coriaceous, mostly 30–50 cm. long and 12–20 cm. wide, cuspidate-acuminate, the basal lobes semioblong, separated by a deep, acute or obtuse

sinus, the basal nerves about 4 pairs, the costal nerves 4-5 pairs; peduncles 5-10 cm. long or more, the spathe green or on the margins whitish, purplish within, as much as 17 cm. long and about 2.5 cm. thick; spadix sessile, the pistillate portion pale yellowish, 1 cm. thick, the staminate part whitish, 7-8 cm. long; pistils 2 mm. long, 5-7-celled; berries dirty yellow, obovoid, 3.5 mm. long.

**Philodendron Smithii** Engler, Bot. Jahrb. 26: 540. 1899.  
*P. Donnell-Smithii* Engler ex Donn. Smith, Enum. Pl. Guat. 2: 77. 1891, nomen. *Chuyuac*, *Okil* (Petén, fide Lundell).

Epiphytic in wet forest, ascending from sea level to about 1500 meters; Petén; Alta Verapaz; Izabal (type from Río Dulce, *J. D. Smith 1535*); reported from Quezaltenango. British Honduras; Honduras(?); Nicaragua(?).

A large vine, the upper internodes 3-4 cm. long; petioles terete, 45 cm. long; leaf blades coriaceous or subcoriaceous, subtriangular-cordate-ovate, about 40 cm. long and 28 cm. wide, short-acuminate, deeply cordate at the base, the sinus open, broad, oblong, the basal lobes rounded, about 10 cm. long and broad, the primary lateral nerves on each side about 4 basal and 3 costal ones, divergent at an angle of about 60 degrees; peduncles often elongate and 20 cm. long; tube of the spathe ovoid, 5-7 cm. long, 3 cm. broad, the limb ovate, short-cuspidate, 6-7 cm. long, 5 cm. wide, or the spathe frequently larger, pale green outside, rose-red or brick-red within; spadix short-stipitate, the pistillate portion cylindric, 2.5-3.5 cm. long, 10-12 mm. thick, the staminate portion cylindric, obtuse, 6-7 cm. long, 1 cm. thick; pistils ovoid, 1.5 mm. long, 8-celled, the cells 1-ovulate.

The large leaves of this or some other species are much used in Cobán for wrapping articles of food.

**Philodendron tripartitum** (Jacq.) Schott, Melet. 1: 19. 1832.  
*Arum tripartitum* Jacq. Hort. Schoenbr. 2: 33. pl. 190. 1797. *Contin.*

Wet forest, 1500 meters or lower; Alta Verapaz; Izabal; reported from Santa Rosa; San Marcos. Chiapas; British Honduras to Panama; Jamaica; South America.

A large or small vine, the internodes of the caudex 5-12 cm. long, 1-1.5 cm. thick; petioles terete, 20-30 cm. long, attenuate upward; blades thin-coriaceous when dried, 3-parted almost to the base, the divisions subequal, 15-25 cm. long, 4-7 cm. wide, the midlobe oblong-lanceolate, cuspidate-acuminate; peduncles solitary, 3-5 cm. long; spathes whitish or pale green, yellowish above, the tube oblong, 3-4 cm. long, the blade ovate or ovate-oblong, 5-6 cm. long, short-acuminate, about 3 cm. wide; spadix borne on a stipe 2-4 cm. long, the pistillate portion 3-4 cm. long, 8-10 mm. thick, the staminate part 3.5-5 cm. long, slightly attenuate upward; pistils cylindric, 1.5-1.8 mm. long, 7-11-nerved, the cells 1-3-ovulate; berries red.

Dr. Birdsey has suggested that the Guatemalan material may be *P. Fenzlii* Engler. However, as it has not been possible to place re-

liance on the relative length of the lateral leaflets, a character used for separating *P. Fenzlii* from *P. tripartitum*, the Guatemalan material has been placed tentatively in *P. tripartitum*.

**Philodendron Warscewiczii** C. Koch, Ind. Sem. Hort. Berol. App. 14. 1855; Engler, Pflanzenreich IV. 23Db: f. 41. 1913. *Guacamayo*; *Cupapayo*; *Mano de león*.

Usually in rather dry or sometimes moist or wet forest, generally growing on rocks but sometimes epiphytic, 1900 meters or lower; Zacapa; Jalapa; Jutiapa; Santa Rosa. El Salvador to Panama.

A small or large vine, the caudex very stout, 7–10 cm. in diameter, the internodes rather long; petiole subterete, 60–80 cm. long, 2 cm. thick; blades triangular-sagittate in outline, bipinnately parted or bipinnatisect, the principal lateral segments 25–30 cm. long, the segments acute or attenuate, 1–2 cm. wide; peduncle 4–5 cm. long; spathe scarcely constricted, purple within, 15 cm. long, 4 cm. in diameter, convolute; spadix sessile, the pistillate portion cylindric, 4 cm. long, almost 2 cm. thick at the base, the staminate part 10 cm. long, 1.5 cm. thick; pistils elongate-cylindric, 6-celled, 5 mm. long, 2 mm. thick; berries cylindric, 8 mm. long, the cells 3–4-seeded; seeds 2.5 mm. long.

Known in El Salvador by the names “copapayo” and “ocopapayo,” and in Nicaragua as “papaya de monte.” The large fruits are very sweet, juicy, and edible. When growing in dry, exposed places this is practically a deciduous plant, the large leaves turning yellow as the dry season advances, withering, and falling from the caudex. At the height of the *verano* the plants may be quite leafless.

## PISTIA L. Water Lettuce

*Reference:* Engler, Pflanzenreich IV. 23F: 258. 1920.

Floating, aquatic herbs, acaulescent, emitting numerous long roots; leaves spirally arranged in a rosette, spongy, broad, densely covered with minute, few-celled hairs; inflorescences very shortly pedunculate, the spathes foliaceous, whitish, glabrous within, pilose outside, the pistillate inflorescence 1-flowered, the staminate 2–8-flowered; flowers unisexual, naked; staminate flowers with 2 stamens, these short-connate, the anther cells opening by 2 vertical slits; ovary of the pistillate flower 1-celled, ovoid; ovules numerous, orthotropous, dense, 4–6-seriate; style short, terminal, the stigma obtuse, penicillate; fruit small, baccate, ovoid, with few or numerous seeds, irregularly dehiscent; seeds cylindric, subtruncate at the apex, excavate at the middle.

A single species is known, widely distributed in tropical and subtropical regions of the earth.

**Pistia Stratiotes** L. Sp. Pl. 963. 1753. *Lechuga*; *Lechuga de agua*; *Xicinchah* (Petén, Maya, fide Lundell). Figure 59.



Generally distributed in quiet fresh water, especially about the margins of lakes and ponds, 1200 meters or lower, or even occasionally at higher elevations; Petén; Izabal; Zacapa; Escuintla; Guatemala; Quezaltenango (in pond near Quezaltenango, perhaps

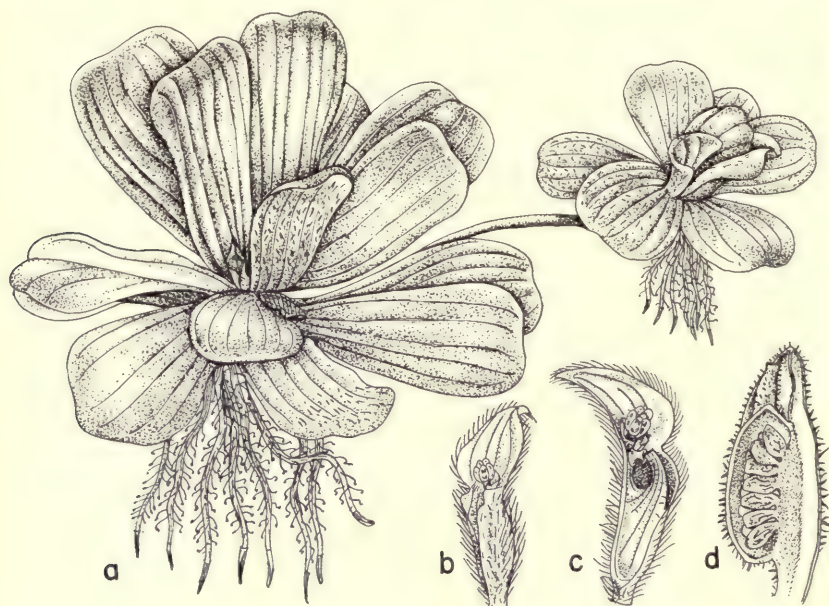


FIG. 59. *Pistia Stratiotes*. a, Habit ( $\times \frac{1}{2}$ ). b, Flower ( $\times 2$ ). c, Flower with part of spathe removed ( $\times 2$ ). d, Longitudinal section through ovary ( $\times 3$ ).

introduced). Ranging from southern Texas and Florida southward throughout all warmer parts of America; also in the Old World tropics.

Leaves numerous, mostly 4.5–8 cm. long, very thick, soft, and spongy, pale green, cuneate-ovate, broadly rounded or emarginate at the apex, sessile.

Known in El Salvador by the names "lechuga de sapo," "disciplinilla," "repollo de agua," and "verdolaga de agua;" the Maya name is reported from Yucatan as "ibinha." The plant is common in all the lowland waters of Guatemala, as in Central America generally. It is easily recognized by its rosette-like form and floating habit. In general appearance it has no resemblance to any other member of the Araceae. The inflorescences are so small that they are seldom seen or noticed. The plants often are grown in aquaria in the North. The most usual name for them in Central America is "lechuga de agua."

**RHODOSPATA** Poeppig

*Reference:* Engler & Krause, Pflanzenreich IV. 23B: 90. 1908.

Epiphytic vines, rooting at the nodes; leaves distichous, the petioles about equaling the blades, the sheath elongate, clasping at the base, the petiole geniculate and slightly thickened below the blade, the blades oblong-elliptic, thin, slightly inequilateral, the primary and secondary nerves numerous, parallel, spreading or ascending, arcuate near the margin; peduncles shorter than the leaves, the spathe broadly ovate or oblong-ovate, abruptly cuspidate, longitudinally nerved, green outside, whitish or pink within, soon deciduous; spadix stipitate, cylindric, densely many-flowered, sometimes with only pistillate flowers at the base, most of the flowers perfect; stamens 4, the filaments rather broad, complanate, narrowed to a slender, acuminate connective, the anthers rather broad, the cells elliptic, longer than the connective; fertile ovary quadrangular, 2-celled, the ovules several in each cell; stigma linear or rarely 2-3-lobate; berries small, cylindric-prismatic, truncate, 2-celled, 10-12-seeded; seeds vertically imbricate, rounded-reniform, lenticular.

About 10 species are known, distributed from Guatemala to Brazil. One other Central American one is recorded for Costa Rica.

Sheath of the petiole extending upward to the node of the petiole. . . . . *R. nervosa*

Sheath of the petiole ending some distance below the node. . . . . *R. Tuerckheimii*

***Rhodospatha nervosa*** Lundell, Contr. Univ. Mich. Herb. 6: 3. 1941.

Wet forest, about 150 meters; British Honduras (type from Middlesex, Stann Creek District, *P. H. Gentle 2797*; also Cockscomb Mountains, *Schipp S126*).

A large epiphytic vine; petiole broadly vaginate below, the sheath extending to the base of the node, the node about 2.5 cm. long; leaf blades stiff-membranaceous, ovate-oblong or broadly ovate, 45-60 cm. long, 20-35 cm. wide, obtuse or rounded at the apex and short-cuspidate, broadly rounded at the base, sometimes abruptly short-decurrent, the primary lateral nerves about 40 on each side, very slender, prominent beneath; peduncles stout, 8-15 cm. long; spathe deciduous; stipe of the spadix 1 cm. long; spadix at anthesis 11 cm. long, 11 mm. in diameter, in fruit about 16 cm. long and 1.5 cm. in diameter; stamens 3-4.5 mm. long, the anthers 1.2 mm. long; ovary 2 mm. long, the ovules numerous; style about equaling the ovary, the stigma elevated.

***Rhodospatha Tuerckheimii*** Engler & Krause, Pflanzenreich IV. 23B: 92. 1908.

Wet, mixed forest, 1200 meters or lower; Alta Verapaz (type collected at 1200 meters, *Tuerckheim 1103*); Izabal (Entre Ríos and Montaña del Mico). Atlantic coast of Honduras.

A large epiphytic vine, climbing over trees; petioles about 20 cm. long, the sheath coriaceous, persistent, ending about 3 cm. below the base of the blade; leaf blades 25–40 cm. long, 9–17 cm. wide, abruptly short-cuspidate, obtuse or acute at the base, the primary nerves 12–14 on each side, divergent at a wide angle; peduncles slender, about 25 cm. long; spathe white, oblong, short-acuminate, 10 cm. long, 3.2 cm. wide; spadix cylindric, obtuse, slightly attenuate upward, 9 cm. long, 1 cm. thick, pale purplish; pistils 4 mm. long, 1.5 mm. wide, the apex hexagonal, truncate, crowned by the small rounded stigma.

### SPATHIPHYLLUM Schott

*Reference:* Engler & Krause, Pflanzenreich IV. 23B: 118. 1908.

Plants terrestrial, acaulescent; leaves equitant, thin, the petioles long and slender, often geniculate at the apex, vaginate to the middle or higher, the blade oblong to elliptic, cuspidate-acuminate, the costa stout, the primary and secondary nerves numerous, parallel, slender, spreading or ascending, arcuate near the margin; peduncles as long as the leaves or longer, the spathe cuspidate, decurrent upon the peduncle, membranaceous, at first convolute but soon explanate, withering and persistent; spadix sessile or stipitate, cylindric, erect, densely many-flowered, shorter than the spathe, flowering from below upward; flowers perfect, 3-parted or rarely 2- or 4-parted; sepals fornicate above and subtruncate, coherent or connate to form a truncate cup; stamens as many as the sepals and opposite them, the filaments short, dilated toward the apex, the anthers ovoid, the cells oblong, longer than the connective; ovary oblong, usually 3-celled, the ovules in each cell 2–8; style continuous with the ovary, conically elongate and protruding beyond the perianth, or almost obsolete; stigma 3–4-lobate, sessile; fruit baccate, rounded at the apex or conic-attenuate, 3-celled, the cells 1–8-seeded; seeds oblong, somewhat curved and more or less reniform.

About 25 species are known, ranging from southern Mexico to Brazil, with one species in the Philippines. A few others are known from Central America. The young inflorescences are much eaten in some parts of the Pacific coast of Central America, usually fried with eggs.

Cells of the ovary 2-ovulate; sheath ending well below the node of the petiole.

*S. phrynifolium*

Cells of the ovary 4–8-ovulate; sheath extending almost or quite to the node of the petiole. . . . . *S. blandum*

***Spathiphyllum blandum* Schott, Oesterr. Bot. Wochenbl. 7: 159. 1857. *Huisnay; Guisnay*. Figure 60.**

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FIG. 60. *Spathiphyllum blandum*. *a*, Pistil with sepals ( $\times 4\frac{1}{2}$ ). *b*, Stamen ( $\times 4\frac{1}{2}$ ). *c*, Ovule ( $\times 52$ ). *d*, Leaf blade and portion of sheath attached to petiole ( $\times \frac{1}{2}$ ). *e*, Lower portion of plant ( $\times \frac{1}{2}$ ). *f*, Spadix with most of spathe removed ( $\times 1$ ).





Wet forest, 1500 meters or lower, most frequent at low elevations; type from Guatemala, *Friedrichsthal*, the locality unknown; Alta Verapaz; Izabal; Huehuetenango. British Honduras; Honduras. Southward to Colombia.

Plants about a meter high; petioles 20–40 cm. long, the apical node 2–2.5 cm. long, the sheath broad, reaching almost or quite to the node; blades mostly oblong-elliptic, 20–35 cm. long, 10–20 cm. wide, abruptly short-cuspidate or acute or short-acuminate, acutely contracted at the base; peduncles 30–50 cm. long or more, very slender, the spathe pale green or yellowish, elliptic or obovate, 15–20 cm. long, 6–7 cm. wide, caudate-acuminate, long-decurrent upon the peduncle; spadix whitish, cylindric, obtuse, 5–7 cm. long, at maturity as much as 2 cm. thick; pistils ovoid-conic, 6 mm. long, the cells 6–8-ovulate; style conic, slightly exceeding the ovary.

This species has been confused in Guatemala and elsewhere with *S. Friedrichsthalii* and *S. Wendlandii*, both of which are considered distinct by Dr. George S. Bunting, recent monographer of the genus.

**Spathiphyllum phryniifolium** Schott, Oesterr. Bot. Wochenbl. 7: 159. 1857. *S. Ortgiesii* Regel, Gartenflora 21: pl. 738. 1872. *Gusnay*; *Bushnay*; *Burnay*; *Güisnay*; *Huisnay*.

Moist or wet forest, of the Pacific *boca costa*, chiefly at low elevations but ascending to 1400 meters in Quezaltenango; Santa Rosa; Escuintla; Suchitepéquez; Quezaltenango; San Marcos. Chiapas (whence the type).

Plants about a meter high, with few leaves; petioles about 40 cm. long, very slender, the portion above the node 3 cm. long, the sheath narrow, ending at some distance below the node, the blade broadly oblong or oblong-elliptic, 35–55 cm. long, 16–23 cm. wide, cuspidate-acuminate, contracted at the base and sometimes rather long-decurrent, the primary nerves numerous, ascending at an angle of about 70 degrees; peduncles slender, 60 cm. long or more, the spathe oblong-elliptic, about 15 cm. long and 5–6 cm. wide, green, long-decurrent on the peduncle, cuspidate-acuminate; spadix cylindric, rounded at the apex, 6.5–10 cm. long, 1.2–1.5 cm. thick, or in fruit much thicker; pistils 4–5 mm. long, the style long-produced above the perianth.

The names “gusnay” and “huisnay” presumably are variants of a single name, of Nahuatl origin. The young inflorescences are often offered in the markets at Quezaltenango and elsewhere, but they are seldom served on the table in the hotels of Guatemala, at least in those frequented by tourists. They are gathered after the spathes have opened, and are tied in bunches for sale. An amusing tale is told in connection with this plant. Some few years ago a North American visiting Guatemala was served in some hotel with soup in which he discovered what he took to be diminutive ears of

corn. Upon his return to the United States he reported the matter to the United States Department of Agriculture. Because of the hope of some day discovering the wild ancestor of corn, the Department was interested and sent two men to Guatemala to investigate the plant. Investigation revealed that the supposed corn consisted of the spadices of *Spathiphyllum*, which bear a remote resemblance to much-reduced ears of maize.

### STENOSPERMATION Schott

*Reference:* Engler & Krause, Pflanzenreich IV. 23B: 81. 1908.

Plants epiphytic, usually with elongate and often scandent caudices; petioles long-vaginate, nodose shortly below the apex; blades oblong-elliptic to lanceolate, asymmetric, the primary lateral nerves numerous, ascending; peduncles rather long, at first nutant at the apex, later erect; spathe convolute, finally open, naviculiform, whitish, soon deciduous; spadix stipitate, cylindric, whitish; flowers all perfect, naked; stamens 4, the filaments complanate, abruptly narrowed at the apex into the slender connective, equaling the ovary, the anthers 2-celled, the cells oblong-ovoid, acute, laterally dehiscent by a longitudinal slit; ovary obpyramidal or prismatic, truncate at the apex, 2-celled; ovules 4 or more in each cell, anatropous; style short, thicker than the ovary, the stigma linear-oblong; fruit small, baccate, obovoid, subtruncate at the apex, 2-celled; seeds clavate-cylindric.

The genus contains about 20 species, of which six are recorded for Central America.

Leaf blades 30 cm. long or more; sheath of the petiole extending to the base of the blade. . . . . *S. multiovulatum*

Leaf blades mostly 30 cm. long or shorter; sheath of the petiole ending below the base of the blade. . . . . *S. robustum*

**Stenospermation multiovulatum** (Engler) N. E. Brown, Gard. Chron. III. 15: 684. 1894. *S. Spruceanum* var. *multiovulatum* Engler, Bot. Jahrb. 4: 281. 1885.

Reported by Engler and Krause from rain forest above Purulhá, Baja Verapaz, 1700 meters, *F. C. Lehmann 1359*. Colombia.

Caudex stout, as much as 2 meters long; petioles 20–25 cm. long, vaginate to the apex; leaf blades rigid-coriaceous, oblong or narrowly elliptic-oblong, narrowed to the mucronate apex, cuneately contracted to the base, 30 cm. long or more, 10–14 cm. wide; peduncles 30–45 cm. long; spathe whitish, broadly elliptic, abruptly acuminate, 12–16 cm. long; spadix whitish, short-stipitate, 8–18 cm. long, 12–15 mm. thick.

**Stenospermation robustum** Engler, Bot. Jahrb. 37: 113. 1905.

On trees or rocks, usually in wet forest, 200–1000 meters; Alta Verapaz; Huehuetenango. Costa Rica.



Caudex as much as 2 cm. thick, the internodes short; petioles slightly or much shorter than the blades, the sheath ending 0.5–4 cm. below the base of the blade; leaf blades subcoriaceous, oblong-elliptic, 15–30 cm. long and 5–10 cm. wide, or sometimes larger, short-acuminate, acute at the base; peduncles 30 cm. long; spathe almost pure white; spadix borne on a stipe up to 1 cm. long, 10 cm. long, 1.8 cm. thick; berries ovoid, many-seeded; seeds reniform.

Illustrated, Pflanzenreich IV. 23B: f. 35, A–H. 1905.

## SYNGONIUM Schott

*Reference:* Engler, Pflanzenreich IV. 23E: 121. 1920.

Scandent epiphytes; leaves very variable in form according to the stage of development, the earliest blades ovate, the next sagittate, the adult blades trisect to pedatisect; petioles long, terete above, long-vaginate; peduncles equaling or shorter than the spathes, dependent in fruit; spathes usually yellowish or whitish green or purplish, the tube more or less ovoid, slightly longer than the pistillate inflorescence, the blade oblong-ovate, open in anthesis; spadix much shorter than the spathe, the pistillate portion oblong-conoid, the staminate portion clavate, longer than the pistillate; flowers unisexual, naked; staminate flowers with 3–4 stamens, these connate to form a truncate-obpyramidal, 3–4-sided synandrium, the anthers linear, with a thick connective, dehiscent by a short slit below the apex of the connective; pistillate flowers connate, the ovary obovoid, 2-celled or by abortion 1-celled; ovule solitary in the cell, erect, anatropous; stigma convex or hemispheric; fruits baccate, connate to form an ovoid syncarp; seeds obovoid.

Engler recognizes fourteen species, six or seven of which are Central American.

The following key to the genus was provided by Dr. M. R. Birdsey:

Adult leaf blades of no more than three leaflets (laterals may have auricle); interior of spathe blade clear milky white; stigma bilabiate. . . . . *S. salvadorensis*

Adult leaf blades of more than three leaflets (intermediate stages of three leaflets may be found); interior of spathe blade whitish green; stigma discoidal.

Anthers of male flowers completely fused into a "tooth-like" synandrium with a retuse apex; juvenile leaf blades variously marked with grayish white.

*S. angustatum*

Anthers of male flowers fused to varying degrees into a synandrium with a truncate apex; juvenile leaf blades very rarely variegated, if variegated then with a yellowish shade.

Plant larger and thicker in all parts; adult leaf blades in cross section approximately 325 microns thick; median leaflet 22–47 cm. long; juvenile leaves thick, cordate. . . . . *S. macrophyllum*

Plant smaller and thinner in all parts; adult leaf blades in cross section approximately 160 microns thick; median leaflet 17–38 cm. long; juvenile leaves thin, sagittate or hastate. . . . . *S. podophyllum*

**Syngonium angustatum** Schott, Oesterr. Bot. Zeitschr. 8: 178. 1858. *S. albolineatum* Hort. in Engl. Arac. exs. et illustr. no. 243 (circa 1883). *S. podophyllum* Schott, var. *albolineatum* (Hort.) Engler, Pflanzenreich IV. 23E: 129. 1920.

Wet forest, epiphytic, near sea level; Petén; Izabal (near Puerto Barrios). Mexico (Tabasco); Costa Rica.

*Juvenile shoots:* stems not glaucous, but with numerous, small, rough emergences, internodes very short, scarcely 1 cm. long in non-scandent stage, up to 15 cm. or more long in scandent stage; petioles 3–22.5 cm. long, vaginate less than one-third the length; lamina variously marked with gray-green, the first-formed laminae cordate, later ones sagittate to hastate. *Adult shoots:* internodes very short in rosette stage, up to 8 cm. long and 1.5 cm. in diameter in later scandent stage, with numerous rough emergences; petioles vaginate from more than one-half to four-fifths their length; laminae dark green, occasionally with gray-green on midrib, trisect to 11-pedatisect, ultimate leaflet earlike; leaflets gradually, not abruptly, diminishing in size from central to lateral leaflets, elliptic to oblong to lanceolate; peduncle 7.8–13 cm. long, glaucous, tri-cornered; spathe tube 2–4 cm. long, 1.2–2.6 cm. wide, elliptic, green within and without, persisting in fruit and becoming red to reddish orange; spathe blade 5.6–9 cm. long, 1.5–3 cm. wide, cream-colored within and without, deciduous after flowering of staminate part of inflorescence; pistillate inflorescence 1.3–2.7 cm. long, 0.4–1.1 cm. wide, dull green, oblique at base, becoming gradually attenuate; staminate inflorescence oblong, gradually tapering at base, obtuse at apex, 2.6–6.5 cm. long, 0.5–1.5 cm. wide, light yellow; pistillate flowers mostly irregularly hexagonal, stigma discoidal; staminate flowers completely fused into a synandrium, usually of 4 anthers, rarely 5, the apex markedly retuse, forming a tooth-like structure; sterile staminate flowers on the lower part of the inflorescence, more irregular and less retuse; fruit brown with darker brown flecks, 2–4.4 cm. long, 1.5–2.4 cm. wide; seeds dark gray.

Dr. Birdsey has supplied the description of this species.

**Syngonium macrophyllum** Engler, Pflanzenreich IV. 23E: 128. 1920.

Wet forest, epiphytic, mostly near sea level to 300 meters, rarely to 1000 meters; Izabal; Alta Verapaz. Mexico (Tabasco); El Salvador; Honduras; Costa Rica; Panama. Plants from Colombia may belong here.

*Juvenile shoots:* stems glaucous, the internodes 0.8–5.2 cm. long, usually scandent; petioles 7.5–25 cm. long, glaucous, vaginate one-third to one-half the length; laminae coriaceous, ovate-cordate to ovate-sagittate to elliptic-hastate in more mature shoots. *Mature shoots:* stems scandent, glaucous, internodes 2.5–4 cm. long, up to 4 cm. thick; petioles glaucous, 25–78.5 cm. long, vaginate one-half to two-thirds the length; laminae coriaceous, medium green, pedatisect up to 9 leaflets; peduncle 10–20.5 cm. long, up to 8 inflorescences per leaf axil; spathe tube ovate, green within and without, glaucous, 3–5 cm. long, 1.5–2.2 cm. wide; spathe blade at first green, later light cream with greenish suffusion, apparently early de-

ciduous, oblong, short mucronate at apex, 6.7–9 cm. long, 1.4–2.4 cm. wide; pistillate inflorescence gradually attenuate above, light green, 1.1–2 cm. wide (when fresh); staminate inflorescence oblong, cylindrical, gradually attenuate above, obtuse at apex, abruptly constricted at base just above the sterile staminate portion; sterile staminate portion about the width of the pistillate section, light brownish-yellow, 5.3–9 cm. long, 1.1–1.6 cm. wide (when dry), 6.8–10.4 cm. long, 1.5–2 cm. wide (when fresh); pistillate flowers irregularly pentagonal or hexagonal, stigma subsessile, discoid, yellowish at first, becoming black; staminate flowers of 4 anthers fused into a synandrium, the line of fusion very slightly or not at all visible, apex truncate or retuse; sterile staminate flowers somewhat larger, the sides straight and not indented as in the fertile staminate ones; fruit large, 6 cm. long, 4.5 cm. wide, brown, with darker brown flecks; tube of spathe surrounding fruit at maturity, green within and without; seeds dark gray, 1.4–1.8 cm. long, 1.4 cm. wide.

Plants of this species have frequently been confused with *S. podophyllum*, according to Dr. Birdsey, who has kindly supplied the description.

**Syngonium podophyllum** Schott, Syn. Aroid. 68. 1856.

Moist or wet forest, chiefly in the *tierra caliente*, ascending to 1350 meters but most plentiful at lower elevations; Petén; Alta Verapaz; Izabal; Chiquimula; Jutiapa; Escuintla; Guatemala; Sacatepéquez; Sololá; Chimaltenango; Suchitepéquez; Retalhuleu; Quezaltenango; San Marcos. Southern Mexico; British Honduras to El Salvador and Panama.

A large or small epiphytic vine, the stems 1–1.5 cm. thick, the internodes up to 10 cm. long; petioles 20–50 cm. long, the sheath as much as 20 cm. long; leaf blades 5–11-cleft, the outer segments gradually smaller, the middle one about 20 cm. long and 6–7 cm. wide, or often smaller, the outer ones oblong-lanceolate, obtuse to long-acuminate, distant, cuneate at the base; peduncles usually several together, about 10 cm. long; tube of the spathe 3–5 cm. long and 1.5–2 cm. thick, oblong-ovoid, green outside, the blade about 6 cm. long and 4–5 cm. wide, mostly whitish green or white or pink within, ovate, cuspidulate; pistillate inflorescence 2 cm. long, green, the staminate 5 cm. long and 10–13 mm. thick, slightly attenuate to each end; ovaries depressed-obpyramidal; fruiting spathes usually turning bright red.

Called “pico de guara” in El Salvador. The Maya name “ochil” is reported from Yucatan. The plant is abundant in many localities, often growing on isolated trees in rather dry regions, for it withstands dry air better than most plants of the family. Perhaps on this account it has proved successful as a pot plant in the United States; it often is planted out of doors in the southern United States. The large and abundant fruiting spathes are showy and rather handsome.



**Syngonium salvadorens** Schott, Oesterr. Bot. Zeitschr. 8: 178. 1858. *S. Donnell-Smithii* Engler, Bot. Jahrb. 37: 141. 1905. *Conte*; *Huevo de burro*.

Moist or wet forest, 1000 meters or less; Izabal; Chiquimula; Santa Rosa; Escuintla (type from Escuintla, *J. D. Smith 2238*); Guatemala; Suchitepéquez; Retalhuleu; Quezaltenango; San Marcos. Chiapas; El Salvador.

A large epiphytic vine, the stems 1 cm. thick, the internodes 4–5 cm. long or more; petioles 20–30 cm. long, vaginate to the middle or higher; adult leaf blades trisect, the segments coherent at the very base, the middle segment ovate or broadly ovate, 15–20 cm. long, about 13 cm. wide, obtuse to acuminate, the lateral segments obliquely oblong or elliptic, slightly shorter than the middle one and about half as wide; peduncles 12 cm. long or less; tube of the spathe 5–6 cm. long, 2–3.5 cm. broad, the limb ovate-oblong, acute, 5–7 cm. long, clear milky white within; pistillate spadix 2 cm. long, the staminate sterile portion 4.5 cm. long and above the middle almost 2 cm. thick; syncarp 5–6 cm. long and as much as 5 cm. thick; stigma bilabiate; seeds ovoid, 5–6 mm. long.

In El Salvador called “anona conde,” “anona conte,” and “pico de guara.” The spathes are sometimes bright red at maturity. The spadices are said to be edible when thoroughly ripe.

### UROSPATHA Schott

*Reference:* Engler, Pflanzenreich IV. 23C: 30. 1911.

Terrestrial herbs, growing in swamps, arising from horizontal or perpendicular rhizomes; leaves basal, few, the petioles very long, vaginate only at the base, the blades sagittate; peduncle terminal, the spathe erect, usually colored, convolute below, open above and gradually narrowed to the apex, persistent; spadix short-stipitate or sessile, several times shorter than the spathe, densely many-flowered; flowers perfect, perigoniate; sepals 4–6, fornicate, subtruncate at the apex; stamens 4–6, the filaments rather broad, subcompressed, abruptly narrowed into the connective, scarcely longer than the ovary, the anthers exceeding the connective, the cells ovate-elliptic, dehiscent by an extrorse, apical slit; pistil truncate-conoid, incompletely 2-celled, the ovules 2 or more in each cell; berry surrounded by the accrescent perianth, 2-celled, or one of the cells aborted, 1–2-seeded.

About 12 species are known, all American and chiefly Brazilian. Another Central American one occurs in Costa Rica.

**Urospatha Tuerckheimii** Engler, Bot. Jahrb. 37: 121. 1905.

Type from Livingston, Izabal, *Tuerckheim II.1131*; represented in the Herbarium of Chicago Natural History Museum by a photograph of the type (Negative no. 12195). Frequent in *Manicaria* swamps of the north coast (Izabal). Endemic.

Plants 1–1.5 meters high; petioles greatly elongate, vaginate for 20 cm.; blades sagittate, 60 cm. long or more, acuminate, the basal lobes equaling or shorter than the midlobe, somewhat divergent, separated by a broad sinus, more or less acuminate; peduncles about 50 cm. long; spathe bronze outside, yellow-green within, linear-lanceolate, twisted above, 20–35 cm. long, 3.5–6 cm. wide, narrowly long-attenuate, open almost to the base; spadix short-stipitate, 4–7 cm. long, 1.5–2 cm. thick, very obtuse, purplish green; sepals 4; cells of the ovary 2-ovulate.

A rather showy but not especially handsome plant, its huge leaves succulent, soft and flabby. The plant in gross aspect is quite similar to *U. sagittifolia*, illustrated by Engler, Pflanzenreich IV. 23C: f. 12. 1911.

### XANTHOSOMA Schott

*Reference:* Engler, Pflanzenreich IV. 23E: 41. 1920.

Terrestrial plants with thick rhizomes or tubers, sometimes with elongate caudices, the sap more or less milky; petioles long and thick, vaginate below, the blades sagittate or hastate, or pedately 3–many-cleft; peduncles solitary or several, usually short; tube of the spathe ovoid or oblong, convolute, persistent, constricted above, the blade oblong-cymbiform or oblong-lanceolate; spadix shorter than the spathe, the pistillate portion cylindric, narrowed upward, densely many-flowered, the sterile staminate portion longer than the pistillate, the fertile staminate part thick-cylindric, somewhat narrowed at the apex, twice as long as the pistillate or longer; flowers unisexual, naked; staminate flower with 4–6 stamens, these connate to form a truncate-obpyramidal synandrium, plane at the apex and somewhat 5–6-angulate, the anther cells oblong or oblong-triangular; ovary ovoid, 2–4-celled, the styles thick, coherent as a ring; ovules several in each cell, anatropous, biseriate, erect; stigma discoid or hemispheric-discoid, 3–4-lobate; berries cylindroid, 3–4-celled, crowned by the impressed stigma, the cells many-seeded; seeds ovoid, the testa sulcate, the endosperm copious.

About 40 species are known, extending over most of tropical America, chiefly at low elevations. Seven species are known from Central America.

Leaf blades cleft into 3 or more segments.

Outer lateral segments of the leaves with a rounded lobe at the base. . . . . *X. pedatum*

Outer lateral segments of the leaves not lobate at the base. . . . . *X. Hoffmannii*

Leaf blades sagittate, entire.

Plants without tubers, the caudex developed above the soil, often greatly elongate, thick, and procumbent. . . . . *X. robustum*

Plants with a hypogaeal, more or less tuberous caudex.

Leaves glabrous. . . . . *X. violaceum*

Leaves more or less pubescent beneath. . . . . *X. mexicanum*

**Xanthosoma Hoffmannii** Schott, Oesterr. Bot. Zeitschr. 15: 33. 1865. *Xanthosoma Wendlandii* Schott, Oesterr. Bot. Zeitschr. 15: 33. 1865, nomen. *Acontias Wendlandii* Schott, Oesterr. Bot.

Zeitschr. 8: 178. 1858. *A. Hoffmannii* Schott, Prodr. Aroid. 196. 1860. *X. Hoffmannii* var. *Wendlandii* (Schott) Engl. Fl. Bras. 3, pt. 2: 191. 1878. *Quequescamote de culebra*.

Moist or wet, mixed forest, 700–1700 meters; Alta Verapaz; Chiquimula; Guatemala; Santa Rosa; Suchitepéquez; Huehuetenango. Southern Mexico; Honduras; Nicaragua; Costa Rica.

Plants arising from a small tuberous hypogaeal caudex; leaves glabrous, the petioles 20–30 cm. long; leaf blades reniform in outline, about 25 cm. long and 30 cm. wide, pedatisect, the segments 5–7, the middle one oblong-elliptic, cuspidate, arcuate-cuneate at the base, 16–20 cm. long, 7–10 cm. wide, the lateral segments oblong-elliptic, the outermost smaller; peduncles about 10 cm. long, thicker than the petioles; tube of the spathe oblong, 5–6 cm. long, the limb oblong, cuspidate-acuminate, white, almost 15 cm. long, 4.5–5 cm. wide; stipe of the spadix 1 cm. long, the pistillate portion of the spadix 2.5 cm. long, the sterile staminate part 3–4 cm. long, the fertile staminate portion 7.5–10 cm. long; berries oblong, yellow, 1 cm. long, 4 mm. thick.

Called “comida de culebra” in Costa Rica.

**Xanthosoma mexicanum** Liebm. Vid. Medd. Kjoebenhavn 15. 1850. *Quequeshque de culebra*.

Wet forest, 1200–1800 meters; Huehuetenango (Río Trapichillo, between La Libertad and Paso del Boquerón, *Steyermark 51115*). Southern Mexico; Nicaragua; Panama.

Plants rather small and slender, arising from a small tuberous hypogaeal caudex; petioles long and usually slender, puberulent or short-villous; leaf blades green and glabrous above, sparsely puberulent or short-villous beneath, broadly sagittate-triangular or rounded-ovate, commonly 20–30 cm. long and 15–25 cm. wide near the base, shortly cuspidate-acuminate, the basal lobes somewhat triangular or rounded, often narrowed to an obtuse apex, separated by a very broad and open, usually shallow sinus; peduncles 15–35 cm. long, sparsely pilose; tube of the spathe green and purple, about 6 cm. long and 2 cm. broad, oblong, somewhat pubescent, the limb lanceolate or ovate, acuminate, white, pubescent outside, 8–12 cm. long, 4–5 cm. wide, cuspidate-acuminate; spadix somewhat shorter than the spathe, the staminate portion slender, about 8 cm. long.

There is a popular belief in Huehuetenango that the fruits are poisonous to snakes. The fruits are put in places known to be frequented by snakes, and if the animals eat them, they die—a very proper fate for serpents so foolish.

**Xanthosoma pedatum** Hemsl. Biol. Centr. Amer. Bot. 3: 418. 1885.

Known only from the type, Sacatepéquez, Barranco Hondo, lower slopes of Volcán de Fuego, 1140 meters, *Salvin*.



Plants arising from a tuberous root; petioles about 60 cm. long; leaf blades reniform in outline, glaucescent beneath, about 30 cm. wide, pedately 5-cleft, the segments acuminate, the 3 middle ones truncate at the base, the outermost divisions semihastate, the basal lobe rounded; peduncles shorter than the petioles; spathes 17–20 cm. long, the tube ventricose-tubular, the limb lanceolate, acute; spadix about 12 cm. long, the pistillate portion cylindric, the staminate subclavate; anthers 3–4.

**Xanthosoma robustum** Schott, Oesterr. Bot. Wochenbl. 3: 370. 1853. *X. roseum* Schott, Oesterr. Bot. Zeitschr. 8: 178. 1858. *Quequesque*; *Ququeshque*; *Marac* (Cobán, Quecchí). Figure 61.

Wet soil, usually in marshy or boggy ground, in the open, in thickets, or in thin forest, 900 meters or lower, most plentiful at low elevations; Alta Verapaz; Izabal; Jalapa; Jutiapa; Santa Rosa; Escuintla; Chimaltenango; Huehuetenango; San Marcos; Quezaltenango; Retalhuleu. Honduras to Costa Rica.

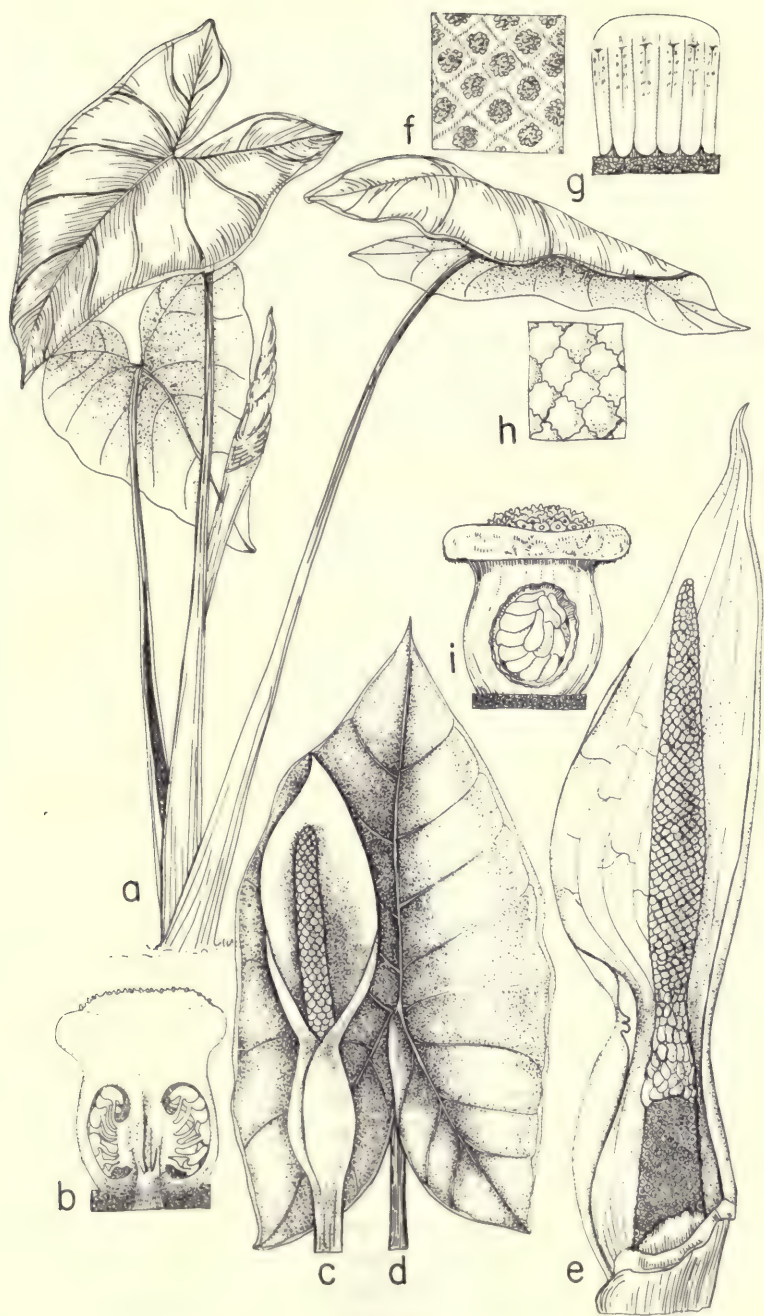
Plants very large and conspicuous, the caudex usually procumbent, often 1–4 meters long and 10–20 cm. thick; petioles 40–180 cm. long or much longer, vaginate to the middle; leaf blades sagittate-ovate, often two meters long but usually shorter, short-cuspidate, the basal lobes half as long as the anterior one, the blades glabrous, grass green above, pale beneath; tube of the spathe 6–10 cm. long, 6 cm. broad, oblong-ovoid, greenish, the limb twice as long, ovate-lanceolate, acute, greenish or whitish outside, white or pink within, 12–25 cm. long and 10–25 cm. wide; spadix stipitate 8 mm., slightly shorter than the spathe, the pistillate portion 3–4.5 cm. long, almost 2 cm. thick.

Called “quiscamote,” “quiscamo,” and “quiscamotillo” in Honduras, and “capote” in Chiapas. Los Quequexques is a *caserío* of the Department of Guatemala, and the vernacular name of the species appears in other local geographic names. The plant grows most often in boggy soil near stream banks, where it sometimes forms wide colonies. Its large leaves make it very conspicuous, and the large spathes also are showy and rather handsome. The long thick trunks, which lie for part of their length flat on the ground, distinguish the plant from all other Central American Araceae.

This species often is planted for ornament in gardens and parks. The huge leaves are used as protection against sudden showers. The young leaves are said to be cooked and eaten in Guatemala, but the

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FIG. 61. *Xanthosoma robustum*. a, Habit ( $\times \frac{1}{8}$ ). b, Longitudinal section through pistillate flower ( $\times 12$ ). c, Inflorescence ( $\times \frac{1}{4}$ ). d, Leaf blade and portion of petiole ( $\times \frac{1}{6}$ ). e, Spadix with portion of spathe removed ( $\times \frac{1}{2}$ ). f, Portion of surface of pistillate spadix ( $\times 2\frac{1}{2}$ ). g, Staminate flowers, lateral view ( $\times 2\frac{1}{2}$ ). h, Portion of surface of staminate spadix ( $\times 2\frac{1}{2}$ ). i, Pistillate flower, lateral view, showing position of ovules ( $\times 12$ ).



roots are regarded as poisonous. The boiled leaves are reputed to be given to nursing mothers to eat in order to stimulate the natural milk supply. The crude milky sap is used in some areas as a substitute for sulfur to coagulate wild rubber (*castilla*) in the fabrication of rain-coats.

Engler and Krause suggested that *X. roseum* may be only a variety of *X. robustum* (Das Pflanzenreich IV. 23E. 47. 1920), and recently Matuda (Las Araceas Mexicanas, in Anal. Inst. Biol. 24: 117. 1954) indicated his belief that *X. roseum* was probably synonymous with *X. robustum*. As the supposed differences in Engler and Krause's key (loc. cit. p. 42) between the two taxa do not appear to hold, as presently available material, at least, indicates, we are using the older name for the Guatemalan material, as suggested by Dr. Birdsey.

**Xanthosoma violaceum** Schott, Oesterr. Bot. Wochenbl. 3: 370. 1853. *Coco* (Izabal); *Quequesque*; *Quequeshque*; *Badú* (Puerto Barrios); *Malanga* (Izabal); *Cascamote*, *Caxcamote* (Quezaltenango); *Ox* (Cobán, Quechí); *Quiscamote*.

Moist or wet thickets or forest, 1900 meters or lower; Alta Verapaz; Izabal; Chiquimula; Santa Rosa; Sacatepéquez; Retalhuleu; Quezaltenango; cultivated commonly in some regions, especially in Alta Verapaz and Izabal. Southern Mexico to Panama; West Indies.

Rhizome hypogaeal, short and thick; petioles 30–70 cm. long, long-vaginate; leaf blades sagittate-oblong-ovate, 20–50 cm. long and 15–40 cm. wide or often larger, paler beneath, glabrous, apiculate-acuminate, the basal lobes short, subtriangular, obtuse, the sinus acute, open; peduncles 15–20 cm. long; tube of the spathe 10 cm. long, 3.5–4 cm. broad, oblong, glaucous, often tinged with violet or dark purple, the limb oblong-lanceolate, yellowish white, 15–20 cm. long, 6–7 cm. wide; pistillate portion of the spadix whitish, 4 cm. long, 2 cm. thick, the fertile staminate part 15 cm. long, the sterile portion 4 cm. long.

Called “malanga” and “quiscamote” in Honduras; “tiquisque” in Costa Rica; “otó” in Panama. The fleshy roots of cultivated plants are cooked and eaten. The plant is much cultivated for food in Alta Verapaz and Izabal, and to a lesser extent in many other parts of the country, chiefly in the lowlands. The roots are poisonous when raw, but the poisonous properties (probably due to the presence of irritating crystals) are destroyed by cooking. A plant with leaves conspicuously tinged with dark purple, probably a form of this species, is planted for ornament in gardens, especially in the Orient.



**ZANTEDESCHIA** Sprengel. Calla

*Reference:* Engler, Pflanzenreich IV. 23Dc: 61. 1915.

Terrestrial plants with thick rhizomes, the leaves several, long-petiolate, the petioles spongy, the blades mostly sagittate or hastate; peduncles long, equaling or exceeding the leaves; spathes large, white or yellow, rarely pink, the tube withering and persistent, the blade open and spreading, recurved and cuspidate at the apex; flowers unisexual, naked; staminate flowers with 2-3 stamens, the anthers cuneate-quadrate, subcompressed, sessile, the thick connective truncate at the apex, the cells oblong, extrorse, opening by a vertical pore; pistillate flowers 1-5-gynous, the ovary short-ovoid, attenuate to a short style, 1-5-celled; ovules usually 4 in each cell, biseriate, anatropous; stigma hemispheric-diskoid; berries obovoid or subglobose, 1-5-celled, the cells 1-2-seeded; seeds ovoid, the testa longitudinally striate.

Eight species are recognized by Engler, all native in southern Africa.

***Zantedeschia aethiopica* (L.) Spreng. Syst. Veg. 3: 715. 1826.**  
*Calla aethiopica* L. Sp. Pl. 968. 1753. *Pseudohomalomena pastoensis*  
 A. D. Hawkes, Madroño 11: 147, fig. 1. 1951. *Cartucho*; *Cala*.

Grown in all regions of Guatemala for ornament, in some localities in quantity in order to sell the flowers, which are abundant in most of the markets; well naturalized locally in Alta Verapaz and at Santa María de Jesús in Quezaltenango, and noted as growing in thickets remote from dwellings in San Marcos. Native of South Africa.

The common calla is too well known to need detailed description. In Guatemala as in most other regions the "flowers" are employed principally for *coronas* and other funeral decorations, for which they have long been favored. They are much used also for decorating altars and shrines, and are liked particularly because water does not have to be changed often for the cut flowers. Nowhere in Guatemala is the plant so well naturalized as on the humid slopes of the Volcano of Irazú in Costa Rica, where wide hedges of them line the lanes. The plants thrive best in very wet places, especially in marshes or swampy meadows, and they have thoroughly established themselves above the electric plant at Santa María de Jesús, where they grow in shallow water with native plants characteristic of such habitats. There is grown in Guatemala also, but rarely, the yellow calla, *Zantedeschia Elliottiana* (Knight) Engler, distinguished by having bright yellow rather than white spathes, and perhaps also the spotted calla, *Z. albo-maculata* (Hook. f.) Baillon, with white or cream-colored spathes, the leaves conspicuously spotted or streaked with white.

LEMNACEAE. Duckweed Family<sup>1</sup>

*References:* Hegelmaier, Systematische Übersicht der Lemnaceen, Bot. Jahrb. Engler 21: 268-305. 1895; Thompson, A revision of the American Lemnaceae occurring north of Mexico, Rept. Mo. Bot. Gard. 9: 21-42. 1897; Bravo, Las Lemnáceas del Valle de Mexico, Ann. Inst. Biol. 1: 7-32. 1930.

Small aquatic plants, floating free, beneath or upon the surface of the water, each plant consisting of a disk-shaped or elongate, fleshy or membranaceous modified stem (frond); frond green, loosely cellular, with or without one or more roots; asexual vegetative reproduction by lateral branching, the branches soon separating; inflorescence consisting of one or more naked monoecious flowers borne on the edge or upper surface of the frond; flower consisting of a single stamen or of a single flask-shaped pistil; anther 2- or 4-celled, the pollen grains spherical and minutely barbellate; ovary sessile, 1-celled, containing 1-6 erect or horizontal, anatropous to orthotropous ovules; fruit a 1-6-seeded utricle.

The members of this family are the smallest of the flowering plants. Of the four genera recognized in the family, three are found in Guatemala.

Fronds without roots; one reproductive pouch.....*Wolffia*

Fronds with one or more roots; reproductive pouches two.

Root solitary.....*Lemna*

Roots several.....*Spirodela*

## LEMNA L.

Fronds disk-shaped or elongate, with a central nerve and sometimes with 2 or 4 lateral nerves, each frond with a single root proliferous from a cleft in the margin toward the base; flowers arising from a cleft in the margin of the frond, usually 3 together surrounded by a spathe; 2 of the flowers staminate, consisting of 1 stamen only, the other flower pistillate, consisting of a simple pistil; filament slender; anther 2-celled, didymous, the cells transversely dehiscent; ovary 1-celled; style and truncate or funnel-shaped stigma simple; ovules and seeds 1-7.

About 10 species, widely distributed. Besides the species listed here, one other is reported for Central America.

Fronds symmetric or almost symmetric.

Plants deep green, thickish, convex on both surfaces, oblong-obovate, obscurely 3-veined, cavernous throughout, appearing medium-thick when pressed; margins thick.....*L. minor*

Plants mostly paler green, the lower surface nearly flat, oblong-elliptic, obscurely 1-nerved, cavernous in the middle portions only, appearing membranous when pressed; margins thin.....*L. minima*

<sup>1</sup> The Guatemalan specimens have been studied and identified by Profesora Maria G. de Bracco of Argentina.

Fronds asymmetric.

Frond distinctly or indistinctly 3-nerved, obliquely obovate to oblong obovate, medium thick, deep green; root sheath with lateral wing appendages.

*L. paucicostata*

Frond obscurely 1-nerved or nerveless, oblong to obovate oblong, thin, pale green; root sheath unappendaged. . . . . *L. valdiviana*

***Lemna minima* Philippi, Linnaea 33: 239. 1864.**

Ponds and spring-fed streams, 1500–3100 meters; Totonicapán; Huehuetenango; Quezaltenango. United States; Mexico; Costa Rica; South America.

Plants solitary or persisting in groups of 2–4; fronds symmetric or with the abscission scar slightly to one side of the median line, oblong to elliptic, mostly 1.5–2.5 mm. long, 0.9–1.5 mm. broad, the apex rounded, obscurely 1-nerved or nerveless, with a row of papules along the midnerve, the lower surface flat or slightly convex, the upper surface usually conspicuously convex, cavernous in the middle portion only, the peripheral portion thin-margined, membranous when pressed; root sheath thin, cylindric, unappendaged; spathe open; pistil short-clavate, with concave stigma; ovule solitary; fruit elongate, erect; seed oblong, pointed, about 16-ribbed, with many transverse striations.

***Lemna minor* L. Sp. Pl. 970. 1753.**

Small pools in streams, bogs, and ponds, or sometimes on moist slopes below waterfalls, 500–1700 meters or less; Petén; Zacapa; Chiquimula; Jutiapa; Sacatepéquez; Escuintla; Suchitepéquez. United States; Mexico; El Salvador; South America; Old World.

Plants solitary or 2–8 attached by the persistent internodes; fronds mostly symmetric, or in fruit slightly asymmetric, suborbicular to elliptic-obovate, 2–4 mm. long, 1.5–3 mm. broad, obscurely 3-veined, rarely 4–5-veined, with a row of papules along the midnerve of the upper surface, both surfaces convex, cavernous throughout, the peripheral portion thick-margined, appearing medium-thick when pressed, the upper surface smooth and glistening, deep green, the lower surface sometimes tinged with red or purple; root sheath long, cylindric, unappendaged; spathe sac-like, with a small cleft opening which is irregularly pierced by the developing floral parts; pistil clavate, with a short style and stigma; ovule solitary, amphitropous; fruit a symmetric subterbinate wingless utricle, projecting about one-third beyond the edge of the plant; seed oblong-ovate, with prominent rounded hilum, 12–15-ribbed, with many transverse striations.

The Maya name of Yucatan has been reported as “Ximha.”

***Lemna paucicostata* Hegelm. ex Engelm. in Gray, Man. Bot. 681. 1868. Figure 62, a–d.**

Pools, small streams, swamps, sometimes around thermal springs, and occasionally on moist faces of cliffs, occurring from sea level to



2800 meters; Petén; Izabal; Chiquimula; Jutiapa; Zacapa; Guatemala; Sacatepéquez; Escuintla; Retalhuleu; Quiché. United States; Mexico; El Salvador; Honduras; Costa Rica; South America.

Plants solitary or occurring in groups of 2-6; fronds strongly asymmetric, rarely nearly symmetric in robust sterile specimens, obliquely obovate to oblong-obovate, 2-3.5 mm. long, 1.2-2.5 mm. broad, distinctly or indistinctly 3-nerved, the apical dorsal papule usually prominent and frequently a row of smaller ones along the midnerve, cavernous throughout, medium-thick; root sheath with lateral longitudinal wing appendages; spathe open; ovule solitary, obliquely orthotropous; fruit asymmetric, ovoid to oblong, ending in a prominent style; seed ovoid to obliquely oblong, slightly compressed, oblique in the utricle, the thick seed coat prominently 12-16-ribbed, with many transverse striations.

This species is often considered synonymous with *L. perpusilla* Torr., but Profesora de Bracco considers the two distinct.

A collection from the Department of Suchitepéquez (*Steiermark* 47697) has been referred by Profesora de Bracco to *L. paucicostata* var. *membranacea* Hegelm.

***Lemna valdiviana*** Philippi, *Linnaea* 33: 239. 1864. *L. cyclostasa* (Ell.) Chev. *Fl. Par.* 2: 256. 1827. Figure 62, e, f.

Reported by Hegelmaier from Atitlán, Sololá, *Bernoulli* (as *L. valdiviana* var. *abbreviata*); Quezaltenango; San Marcos. United States; Mexico; Panama; West Indies; South America.

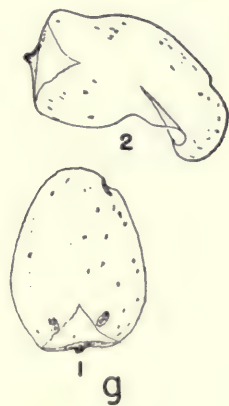
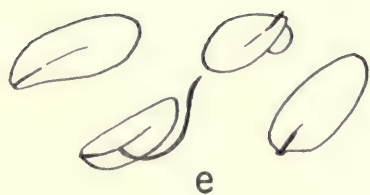
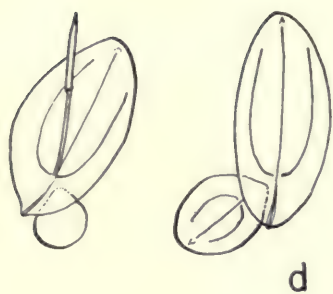
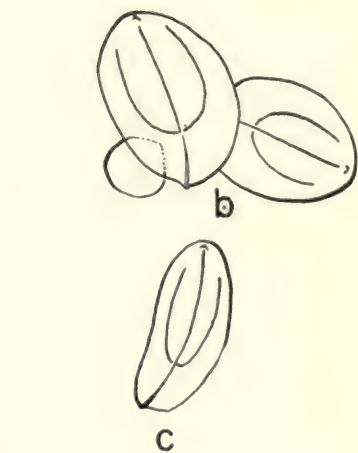
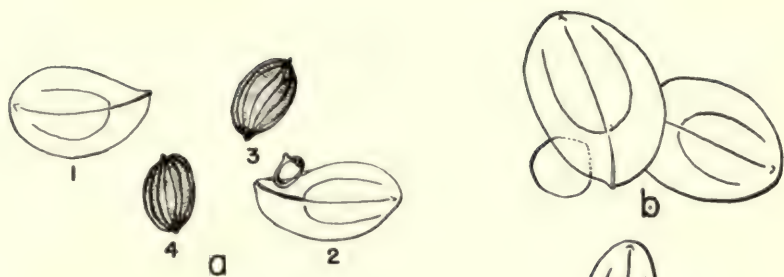
Plants solitary or in groups of 2-8; fronds usually somewhat asymmetric, oblong to obovate-oblong, 2.3-4.5 mm. long, 0.7-1.5 mm. broad, obscurely 1-nerved or nerveless, thin, without papules, cavernous in the middle portions only; root sheath large, thin, cylindric, unappendaged; rootcap strongly curved; spathe open, reniform; style relatively long, straight or sometimes curved; ovule solitary, obliquely orthotropous; fruit slightly asymmetric, ovoid-oblong, about half the length of the frond; seed oblong-ovoid, the thick seed coat 12-19-ribbed, with many transverse striations.

### SPIRODELA Schleiden

Fronds orbicular to oblong or obovate, 5-15-nerved, each frond with 2-16 fascicled roots containing a single bundle of vascular tissue, the stipe attached peltately to the frond back of and below the basal margin; flowers arising from 2 triangular vegetative reproductive pouches which open as clefts in either margin of

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FIG. 62. a-d, *Lemna paucicostata*: a1, Sterile plant ( $\times 14$ ); a2, Plant with fruit ( $\times 14$ ); a3, 4, Seeds ( $\times 7$ ). b, Broad fronds ( $\times 14$ ; *Standley* 89331). c, Narrow frond ( $\times 14$ ; *Steiermark* 46269). d, *L. p.* var. *membranacea* ( $\times 14$ ; *Steiermark* 47697). e, f, *L. valdiviana* ( $\times 14$ ; e, *Steiermark* 36351; f, *Steiermark* 33884). g, *Wolffia Welwitschii*: g1, Sterile plant ( $\times 14$ ); g2, Plant with flowers ( $\times 14$ ).



the basal portion of the frond, usually 3 together surrounded by a sac-like spathe; 2 of the flowers staminate with filaments curving upward from the margin of the frond; anthers 2-celled, longitudinally dehiscent; one flower pistillate; ovary with 2 anatropous ovules; fruit rounded-lenticular, the margins winged.

About 3 species are recognized, one occurring in Asia and Australia and another in South America. Only the following is known from Central America.

**Spirodela polyrhiza** (L.) Schleid. *Linnaea* 13: 392. 1839. *Lemna polyrhiza* L. Sp. Pl. 970. 1753.

Margins of lakes and swamps along streams and at the base of wooded bluffs, 400–500 meters; Petén; Chiquimula; Jutiapa; Guatemala; Retalhuleu. Widely distributed in both hemispheres.

Plants solitary or in colonies of 2–5 attached by the short persistent internodes; fronds slightly asymmetric, suborbicular to suborbicular-obovate, 2.5–9.5 mm. long, 2.2–6.5 mm. broad, 5–15-nerved, each nerve with one vascular bundle, the upper surface bluish green or pale yellow-green above, the lower surface deep purplish red; roots 3–16 on each plant, one vascular bundle in each root; rootcap large and thin; spathe sac-like, opening at the upper end; pistil flask-shaped; ovules 2, anatropous, or frequently one and then amphitropous; fruit a rounded utricle with slightly winged margins; seed slightly compressed, smooth.

## WOLFFIA Horkel

Fronds globose or oblong-ovoid, fleshy, rootless, nerveless, proliferating from a cleft or opening at the basal end; flowers arising from the upper surface of the frond, breaking through the loosely cellular tissue, the spadix consisting of 2 flowers without a spathe, one flower staminate, the other pistillate; staminate flower of one stamen with a 1-celled anther opening by a slit across the top, the two halves opening as valves; pistillate flower of a globular ovary with a short style, depressed stigma, and single orthotropous ovule; fruit a spherical utricle.

This genus consists of the simplest and smallest flowering plants known, the individual plants appearing as tiny specks on the surface of the water. About 8 species, mostly in tropical or subtropical regions; only the following are known from Central America.

Fronds 1-flowered, 0.5–1 mm. long, 0.5–0.8 mm. broad, upper surface convex.

*W. columbiana*

Fronds 2-flowered, 0.5–0.6 mm. long, 0.3–0.4 mm. broad, upper surface flat.

*W. Welwitschii*

**Wolffia columbiana** Karst. Bot. Unters. 1: 103. 1865.

Guatemala (Morán, 1205 meters, *Kellerman 6630*); also reported by Hegelmaier from Atitlán, Sololá (*Bernoulli*). Mexico to South America.



Frond symmetric, elliptic to globose, 0.5–1 mm. long, 0.5–0.8 mm. broad, the upper surface convex, slightly exposed to the air, with usually about 3 small inconspicuous papules in a row along the median line, obtuse at each end, not punctate; single-flowered.

The Maya name of Yucatan for this plant is "iximha." Although we have not seen the specimen, it is probable that the *Wolffia punctata* Griseb. reported by Sereno Watson from Río Chocón, Izabal, should be placed with *W. columbiana*.

*Wolffia Welwitschii* Hegelm. Seem. Journ. 114. 1865. Figure 62, *g*.

Jutiapa (Lago Guija, southeast of Asunción Mita, 470–500 meters, *Steyermark 31812*). Cuba; Venezuela; tropical Africa.

Frond symmetric, flat, thin, elliptic, with many pigment cells in the epidermis, 0.5–0.6 mm. long, 0.3–0.4 mm. broad; two flowers present on a frond; anther 0.1 mm. long; pistil 0.25 mm. high.

## MAYACACEAE

Small mosslike herbs of wet soil, sometimes floating in water, prostrate or repant, branched, the stems densely leafy; leaves short, linear-filiform, spreading in all directions; flowers perfect and regular, the pedicels 1-flowered, solitary in the leaf axils, bracteate at the base and often bearing 2 small bractlets; perianth inferior, biseriate, each whorl 3-parted, the outer calyx-like, the 3 sepals lanceolate, distinct; petals 3, distinct, obovate or rounded, subequal, spreading, in bud imbricate; stamens 3, hypogynous, the filaments short and filiform; anthers erect, basifixed, oblong, the 2 cells parallel, partitioned within, short-dehiscent at the apex; ovary sessile, superior, 1-celled, with 3 parietal placentae; style filiform, simple, the small stigma terminal, entire; ovules numerous on each placenta, biseriate, orthotropous; capsule surrounded by the persistent calyx and stamens, ovoid, membranaceous, dehiscent by 3 more or less distinct valves; seeds ovoid or globose, with basal hilum, terminated by a small tubercle, the testa longitudinally striate and usually tuberculate-rugulose; endosperm farinaceous.

The family consists of a single genus with about 7 species in the warmer regions of America. Only one species is known from Central America.

## MAYACA Aubl.

*Mayaca fluviatilis* Aubl. Pl. Guian. 42. 1775. Figure 63.

In bogs or sometimes in flowing water or shallow ponds, at 1500 meters or less; British Honduras and probably in Petén; Alta Verapaz; Jalapa. Southeastern United States; Honduras; Costa Rica; Panama; West Indies; South America.

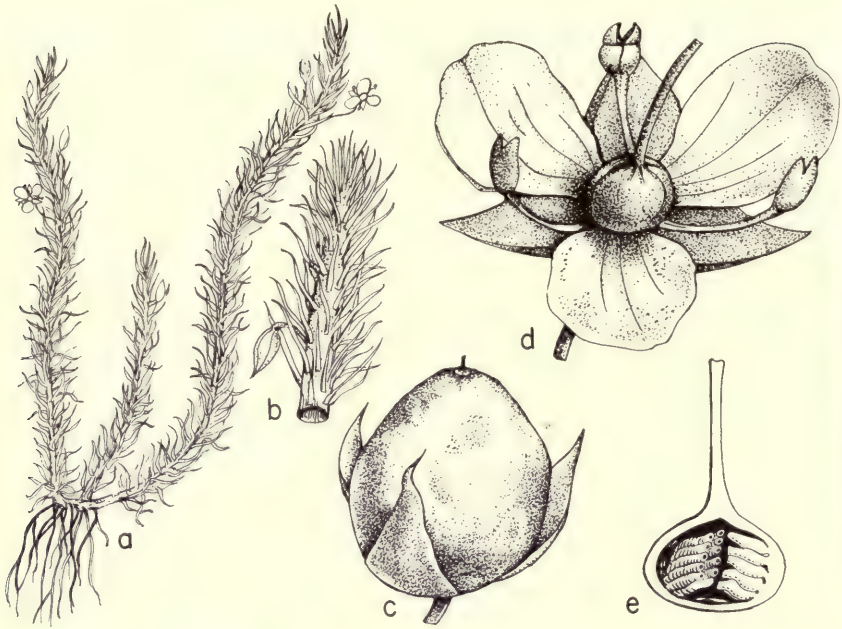


FIG. 63. *Mayaca fluviatilis*. a, Habit ( $\times \frac{1}{2}$ ). b, Portion of leafy stem with flower bud ( $\times 1$ ). c, Fruit with sepals ( $\times 7$ ). d, Expanded flower ( $\times 7$ ). e, Longitudinal section through ovary ( $\times 18$ ).

A small plant, the stems often only 2–3 cm. long but usually longer and sometimes as much as 40 cm., very densely leafy; leaves lance-linear to filiform, 4–12 mm. long, soft, usually very densely crowded at the tips of the branches, spreading, bright green; pedicels equaling or usually shorter than the leaves, often recurved in age; sepals green, 3–4 mm. long; capsule 4–5 mm. long.

This has been reported from Central America as *M. Aubletii* Michx., which is apparently a different species. In general appearance it much resembles some of the species of *Lycopodium*, so much so that at first glance it is difficult to decide which genus is represented. The white flowers are very small and inconspicuous. The plant is to be expected in the savannas of Izabal.

## XYRIDACEAE

Perennial or rarely annual herbs, often cespitose; leaves radical, rosulate or crowded, sometimes distichous, generally linear; scapes erect, rushlike, simple, naked; flowers crowded in a terminal, globose or ovoid head, solitary and sessile within imbricate, coriaceous or rigid bracts; flowers perfect, slightly irregular; perianth inferior, corolloid, simple or double; sepals 3, the middle one large,

petaloid, surrounding the corolla, caducous or sometimes absent; corolla tube slender, short or elongate, the 3 lobes equal, spreading, broad; perfect stamens 3, inserted near the base of the lobes, shorter than the lobes; filaments short, filiform; anthers oblong, dorsifixed, the 2 cells parallel, or divergent at the base, dehiscent by a longitudinal slit; staminodia 3 and alternate with the corolla lobes, or none; ovary sessile, 1-celled or imperfectly 3-celled, the 3 placentae erect from the base of the ovary or usually more or less adnate to the walls; style terminal, simple, or with 3 branches stigmatiferous at the apex; ovules numerous in each cell or sometimes few, 2-seriate, orthotropous; capsule included in the marcescent corolla tube, 3-valvate; seeds numerous, ovoid, bearing a small tubercle at the apex, the testa vertically striate; endosperm farinaceous.

Only two genera are known, the other, *Abolboda*, with very few species, these all in tropical America, but not reaching Central America.

### XYRIS L.

*Reference:* A. G. O. Malme, Die amerikanischen Spezies der Gattung *Xyris* L., Untergattung *Euxyris* (Endlicher), Arkiv Bot. 13, no. 8: 1-32. 1913; N. Amer. Fl. 19: 3-15. 1937.

Annual or perennial, tufted herbs; leaves linear, equitant; scapes simple, terminated by a solitary dense head, usually with a single basal sheath; flowers yellow, almost regular, in globose to ovoid heads; blades of the petals cuneate-obovate, spreading; stamens alternating with staminodia, the filaments short, flattened; staminodia usually bifid at the apex, the branches terminated by tufts of small hairs; ovules few or numerous.

About 100 species, widely distributed in tropical regions. One other is known from Central America.

Flower heads small, 5-7 mm. long; leaves 4-6 cm. long, 1-1.5 mm. wide; keel of the lateral sepals ciliate-scabrous or dentate, especially at the middle, rarely toward the apex. . . . . *X. subnavicularis*

Flower heads large, 8-35 mm. long; leaves 15-80 cm. long, 3-10 mm. wide; keel of the lateral sepals lacerate-dentate, fimbriate, or villous above.

Heads narrowed and subacute at the apex; keel of the lateral sepals ciliate-scabrous; scapes multistriate or multicostate below. . . . . *X. ambigua*

Heads broad and rounded at the apex; keel of the lateral sepals dentate, lacerate, or lacerate-fimbriate; scapes 1-2 costate. . . . . *X. Jupicai*

***Xyris ambigua*** Beyrich ex Kunth, Enum. Pl. 4: 13. 1843.

Savannas or pine ridges, sometimes about ponds, at or little above sea level; British Honduras; southeastern United States; Cuba.

Plants tall, the leaves 15-40 cm. long, 3-6 mm. wide, subobtusate, the margins scabrous or rarely smooth; sheath of the leaf about as long as the blade, slightly dilated and opaque below, pale rusty at the base; scapes 50-90 cm. tall, 1.5-2 mm. thick, subterete, bicostate above, multicostate below, scabrous on the angles; peduncular sheath 10-20 cm. long; heads many-flowered, ellipsoid or ovoid, 10-25



mm. long, 5–7 mm. thick, the outer sterile bracts 2–2.5 mm. long, ovate-deltoid, acute or subobtusate, the fertile bracts obovate-elliptic, 7–8.5 mm. long, 5–6 mm. wide, rounded at the apex, entire or somewhat lacerate at the apex, stramineous, fulvous, or pale-ferruginous, lustrous, with a deltoid or ovate dorsal area about 2 mm. long; lateral sepals lanceolate, 6 mm. long, 1.5 mm. wide, acute; keel broad, scabrous-ciliate from about the middle to the apex; seeds ellipsoid, 0.4–0.5 mm. long.

**Xyris Jupicai** L. Rich. Act. Soc. Hist. Nat. Paris 1: 106. 1792.  
*X. communis* Kunth, Enum. Pl. 4: 12. 1843. Figure 64.

In marshes or bogs, sometimes in sandy soil along streams, 1700 meters or lower; Alta Verapaz; Izabal; Chiquimula; Jalapa; Jutiapa; Santa Rosa. Southern Mexico; British Honduras; Honduras; southern United States; West Indies; South America.

Leaves 12–40 cm. long, 3–5 mm. wide, acute, smooth; sheath equaling the leaf blade or only half as long, fulvous or somewhat ferruginous below, somewhat dilated at the base; scapes usually 30–65 cm. tall, 1–2 mm. thick, 1–2-costate, smooth, the sheath usually 8–15 cm. long, ferruginous or chestnut and shining beneath; heads many-flowered, ovoid or ellipsoid, 8–13 mm. long, 5–8 mm. thick, the outer bracts ovate-elliptic, 2–3 mm. long, rounded at the apex, the floriferous bracts obovate, 5–7 mm. long, 3.5–4.5 mm. wide, entire, fulvous or ferruginous, somewhat lustrous, with a grayish green or green, ovate or elliptic dorsal area 2 mm. long; lateral sepals narrowly spatulate-linear or lanceolate, 3.5–5 mm. long, 0.6 mm. wide, acute; keel narrow and entire below, broader above and lacerate-dentate or shortly lacerate-fimbriate from the middle to the apex; seeds ellipsoid, 0.5 mm. long.

**Xyris subnavicularis** Malme, Arkiv Bot. 13, no. 8: 15. 1913.

Wet soil, at or little above sea level; British Honduras; type from Stann Creek, *John Robertson*; also at All Pines.

Leaves linear, 4–6 cm. long, 1–1.5 mm. wide, subobtusate, scabrous-ciliate on the margins, smooth elsewhere; leaf sheath about equaling the blade, pale-ferruginous, lustrous at the base; scapes 10–15 cm. tall, 0.5–0.7 mm. thick, terete or nearly so, bicostate, especially above, scabrous on the edges, elsewhere smooth, the sheath about 4 cm. long; head few-flowered, ellipsoid, obovoid, or subglobose, 5–7 mm. long, the outer sterile bracts ovate, 3 mm. long, acute or subacute, carinate, the floriferous bracts elliptic, 4–5 mm. long, 3 mm. wide, rounded at the apex, entire, carinate above, ferruginous or fulvous, without a distinct dorsal area; lateral sepals lanceolate, falcate, about 3.5 mm. long and 0.8 mm. wide, acute; keel narrow, scabrous-ciliate in the middle and often also toward the apex.

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FIG. 64. *Xyris Jupicai*. a, Corolla ( $\times 2\frac{3}{4}$ ). b, Habit showing leaves and lower part of scape ( $\times \frac{1}{2}$ ). c, Bract ( $\times 6$ ). d, Habit of inflorescence and upper part of scape ( $\times \frac{1}{2}$ ). e, Lateral sepal ( $\times 10$ ).



## ERIOCAULACEAE. Pipewort Family

*References:* Harold N. Moldenke, Eriocaulaceae, N. Amer. Fl. 19: 17-50. 1937; The Eriocaulaceae of the Yucatan Peninsula, Carnegie Inst. Wash. Publ. 522: 139-147. 1940.

Mostly perennial herbs of wet soil, sometimes growing in water, the stems usually short; leaves mostly basal and tufted, narrow and grass-like, generally crowded; flowers monoecious, rarely dioecious, capitate, in terminal, solitary or umbellately aggregate, involucrate heads, borne on usually long and slender, scapose peduncles, these vaginate at the base; flowers regular, numerous, very small, sessile or short-pedicellate on a receptacle, each borne in the axis of a scarious scalelike bractlet; staminate and pistillate flowers mixed together, the staminate usually in the center; perianth scarious or membranous, 2-3-parted; stamens as many as the outer perianth segments and alternate with them or twice as many; filaments distinct, the anthers small, 2-4-celled, opening by longitudinal slits, introrse; ovary superior, 2-3-celled, the style terminal; stigmas 2-3, simple or lobate; ovules solitary and pendulous in each cell, orthotropous; capsule 2-3-celled, membranous, loculicidally dehiscent; endosperm copious.

Nine genera with many species, widely dispersed in tropical regions of both hemispheres, a few species in temperate regions. The family is best represented in Brazil, especially in the region of Minas Geraes. Only the following genera are represented in Central America. The plants constitute a difficult group, with microscopic flowers that can be dissected with difficulty. The following treatment is copied from those by Moldenke. The family is surprisingly well represented in the pine forests of British Honduras, but the Guatemalan species are very few indeed.

Plants with elongate leafy stems, the stems floating on or submerged in water; peduncles axillary. . . . . *Tonina*

Plants acaulescent or essentially so, usually terrestrial, the leaves all at the base of the scape, the peduncles terminal, or at least appearing so.

Stamens 4 or 6, twice as many as the outer perianth segments. . . . . *Eriocaulon*

Stamens 2-3, as many as the outer perianth segments.

Inner perianth segments of the pistillate flowers free. . . . . *Paepalanthus*

Inner perianth segments of the pistillate flowers connate at the middle.

*Syngonanthus*

## ERIOCAULON L. Pipewort

Plants mostly perennial, the stems very short in Central American species; leaves often numerous at the base of the scape, linear or nearly so, amplexicaul; flowers 2-3-parted, the staminate mixed with the pistillate or segregated in separate heads; perianth almost always double; sepals of the staminate flower free at the base or more or less connate; petals 2-3, united below into a tube, the lobes usually bearing a small black gland on the inner surface near the apex; stamens twice as many as the sepals, exserted, the anthers 4-celled, mostly black; pistillate



flowers with free or rarely connate sepals, the petals free or rarely none, usually black-glandular inside below the apex; stigmas 2-3, simple.

About 360 species, mostly in tropical regions, and most numerous in Brazil. Three other species are known from southern Central America.

Pistillate flowers without glands. . . . . *E. bilobatum*

Pistillate flowers with glands.

Staminate and pistillate flowers 2-parted; stamens 4; stigmas 2; ovary 2-ovulate.

Mature flower heads white-villous at the apex, 4.5-7 mm. in diameter.

*E. Kinlochii*

Mature flower heads blackish, glabrous, 1.5-3 mm. in diameter.

*E. fuliginosum*

Staminate and pistillate flowers 3-parted; stamens 6; stigmas 3; ovary 3-ovulate.

Stems elongate, floating. . . . . *E. Schippii*

Stems short, not floating.

Petals of the pistillate flowers black-glandular. . . . . *E. Ehrenbergianum*

Petals of the pistillate flowers not glandular. . . . . *E. Williamsii*

### **Eriocaulon bilobatum** Morong, Bull. Torrey Club 19: 226. 1892.

In wet mud bordering a swamp, about 1000 meters; Jutiapa (plains between Agua Blanca and Amatillo, *Steyermark 30405*). Jalisco, Mexico.

Plants probably annual, acaulescent or nearly so; leaves rather numerous, narrowly linear, 1.5-5.5 cm. long, about 1.2 mm. wide, subulate at the apex, 2-3-nerved, glabrous; peduncles 2-8 and 1.5-11 cm. long, 5-costate, glabrous; flower heads blackish, ovoid-globose, 2-3.5 mm. in diameter; involucre bracts grayish, oblong or lance-oblong, acute or subacute, glabrous; bractlets lance-oblong, longer than the flowers and hiding them; staminate sepals 2-3, connate into a glabrous, grayish white or stramineous spathe, this shortly 3-fid at the apex; petal tube bearing at the apex very small, slightly unequal lobes, these marked with fuscous glands; stamens 6; pistillate sepals 2-3, very narrowly linear, unequal, glabrous; petals none; stigmas 3, filiform; ovary 3-ovulate.

### **Eriocaulon Ehrenbergianum** Klotzsch ex Koern. in Mart. Fl. Bras. 3, pt. 1: 491. 1863.

Open bogs, 1500-1700 meters; Sacatepéquez; Quiché. Mexico.

Plants acaulescent; leaves linear or ensiform, 1-8 cm. long, 2 mm. wide, obtusely subulate at the apex, 5-10-nerved, glabrous; peduncles 1-5, much exceeding the leaves, 7-30 cm. long, 6-sulcate, glabrous; sheaths rather loose, about equaling the leaves; flower heads subglobose, 5-8 mm. in diameter, white-villous; involucre bracts membranous, golden brown or yellowish green, ovate, very shortly cuspidate; staminate sepals 3, spathaceous-connate, olivaceous-nigrescent, spatulate-oblong, subacute, pilose at the apex; corolla lobes 3, short, pilose, black-glandular; anthers 6, black; pistillate sepals 3, olivaceous-nigrescent, broadly lanceolate, acute,

pilosulous dorsally, carinate; petals 3, whitish, obtuse, glandular, the upper half pilose on both surfaces.

**Eriocaulon fuliginosum** C. Wright ex Griseb. Cat. Pl. Cub. 226. 1866.

In pine ridges, at or little above sea level; British Honduras; Cuba.

Plants acaulescent; leaves spreading or recurved, narrowly or rather broadly linear, often ensiform, narrowed from the base to the apex, 5-9-nerved, glabrous; peduncles numerous, 2.5-18 cm. long, 5-7-costate, glabrous; sheaths shorter than the leaves; heads very small, hemispheric, blackish, 1.5-3 mm. in diameter, glabrous; involucre bracts membranous, yellowish hyaline or grayish brown, broadly ovate or ovate-elliptic, subacute, glabrous; receptacle glabrous; staminate sepals 2, cuneiform-spatulate or obovate, glabrous, slightly connate at the base; petal tube white, the 2 lobes minute, subacute, not glandular; anthers 4, black; pistillate sepals 2, dark olivaceous or fuscous, obovate, acute, carinate, glabrous; petals 2, black or almost hyaline, oblong-spatulate or obovate, not glandular, glabrous; style short, the stigmas 2, longer than the style.

This has been reported from British Honduras as *E. Schiedeianum* Koern., a species of central Mexico.

**Eriocaulon Kinlochii** Moldenke, N. Amer. Fl. 19: 23. 1937.

Known only from the type, Stann Creek Valley, Stann Creek District, British Honduras, *J. B. Kinloch 213*.

Plants acaulescent; leaves numerous, tufted, spreading or recurved, broadly linear, 3-8 cm. long, 1 mm. wide, long-attenuate and filiform at the apex, 6-7-nerved, glabrous; peduncles mostly 1 on each plant, 5.5-14 cm. long, 3-costate, glabrous; sheaths loose, 1-3 cm. long; flower heads hemispheric or globose, 4.5-7 mm. in diameter, white-villous; involucre bracts pale stramineous, elliptic-obovate, acute or obtuse, glabrous; receptacle glabrous; staminate flowers short-pedicellate, the 2 sepals hyaline, obovate, cucullate, pilose dorsally at the apex; petal tube whitish, the 2 lobes brown-glandular at the apex, short-pilose on both surfaces; anthers 4, black; pistillate flowers on very short pedicels, the 2 sepals hyaline, obovate, acute, carinate, short-pilose toward the apex; petals 2, obovate, subacute, short-pilose toward the apex, glandular at the apex; ovary long-stipitate, 2-celled.

This has been reported from British Honduras as *E. Benthamii* Kunth, a species of Mexico.

**Eriocaulon Schippii** Standl. ex Moldenke, N. Amer. Fl. 19: 34. 1937.

Known only from the type, All Pines, Stann Creek District, British Honduras, at sea level, growing in shallow pools in brackish swamps, *W. A. Schipp 647*.

Stems elongate, floating or submerged, densely leafy below; leaves narrowly linear, capillaceous toward the apex, flat, lax, 4–8 cm. long, 0.4 mm. wide, glabrous; peduncles numerous, umbellately congested in groups of 6–16 at the ends of the stems, faintly 5–7-striate, glabrate; flower heads blackish, hemispheric, 2–3.5 mm. in diameter; involucre bracts blackish, ovate, obtuse, glabrous; receptacle glabrous; staminate sepals 3, grayish, subacute, glabrous; petal tube white, the lobes very small, hyaline, black-glandular, glabrous; anthers 6, black; pistillate sepals 3, blackish, connate at the base, obovate, obtuse, not carinate, sparsely pilose dorsally; petals 3, narrowly spatulate, black-glandular, glabrous; ovary 3-celled.

**Eriocaulon Williamsii** Moldenke, N. Amer. Fl. 19: 36. 1937.

Orange Walk District, British Honduras, in clay soil in dried ponds, *W. C. Meyer 134*.

Plants dwarf, acaulescent; leaves tufted, erect or spreading, linear, 1–4.5 cm. long, 1–2 mm. wide, subulate at the apex, many-nerved, glabrous; peduncles 3–4, rather obscurely 3-costate, 1.5–6.5 cm. long, glabrate; flower heads hemispheric or ovoid-conic, dark gray, 2.5–4 mm. in diameter; involucre bracts rather few, light stramineous, ovate, obtuse, glabrous; receptacle glabrous; staminate flowers long-pedicellate, the 3 sepals blackish, glabrous; petal tube pale stramineous, the lobes minute, glabrous; anthers 6, white; pistillate flowers pedicellate, the 3 sepals narrowly linear, glabrous; petals hyaline, narrowly linear, glabrous; stigmas 3.

### PAEPALANTHUS Martius

Plants various in habit, the local species with short stems or acaulescent; leaves mostly narrow and grass-like; flower heads villous, the flowers mostly polygamous, 2–3-parted; perianth double, involute; staminate sepals more or less connate near the base, the petals connate into a hollow, usually glabrous, eglandular, slightly 2–3-lobate tube; stamens 2–3, opposite the petals, exserted, the anthers 4-celled; pistillate sepals usually connate at the very base; petals free, eglandular; ovary 2–3-celled, the style usually appendaged; stigma simple or more often 2-fid.

About 450 species, in tropical America, most numerous in Brazil. One other Central American species occurs in Costa Rica.

Flower heads gray, cylindric-elongate.....*P. Gentlei*  
Flower heads dark brown, globose.....*P. Lamarckii*

**Paepalanthus Gentlei** Moldenke, N. Amer. Fl. 19: 40. 1937.

Endemic in British Honduras, at or little above sea level, growing in wet soil; type from Maskall, *P. H. Gentle 992*.

Stems simple, 3–4 cm. long; leaves linear, 2–4.5 cm. long, 3–4 mm. wide, attenuate to the acute apex, dilated and clasping at the base, sparsely strigillose or ciliate; peduncles clustered at the ends of the stems, 3–8.5 cm. long, 3-costulate, glabrate; sheaths 10–15 mm. long; flower heads gray, cylindric-elongate, 3–7 mm. long, 3 mm. broad; outer involucre bracts stramineous, elliptic-obovate, acuminate, ciliate; receptacle pilose; staminate sepals 3, light brown, acute, ciliate; an-



thers 3, white; pistillate sepals 3, obtuse, glabrous, the petals narrowly oblong, ciliolate above; seeds light yellow, cancellate, the striae minutely puberulent.

**Paepalanthus Lamarckii** Kunth, Enum. Pl. 3: 506. 1841.

In wet soil, at or little above sea level; British Honduras; Panama; West Indies; South America.

Stems simple, 2–8 cm. long; leaves linear-lanceolate or broadly linear, 1.5–3 cm. long, 0.5–2.3 mm. wide, dilated and clasping at the base, narrowed to a rather acute or obtuse apex, multistriate, sparsely puberulent or pilose; peduncles clustered at the end of the stem, usually numerous, 1.5–7 cm. long, pilose; sheaths 9–13 mm. long, long-pilose; flower heads dark brown, globose, 2–3 mm. in diameter, villous; involucre bracts gray-brown, obovate, subacute, densely pilose at the apex; receptacle pilose; staminate sepals 3, dark brown at the apex, spatulate, obtuse, ciliate at the apex; stamens 3; pistillate sepals pilose on the margins and apex; ovary 3-celled; seeds slightly curved, cancellate.

**SYNGONANTHUS** Ruhland

Stems usually very short; leaves mostly grass-like; flower heads pilose or subglabrate; bractlets usually none on the receptacle; flowers 3-parted, the sepals free or nearly so; staminate petals connate into a 3-lobate glabrous tube; anthers 4-celled; pistillate petals connate at or above the middle, the base and apex free.

About 160 species, mostly in tropical America, a few in tropical Africa. Only the following occur in Central America.

Peduncles glabrous or nearly so. . . . . *S. Oneillii*

Peduncles conspicuously pubescent.

Involucre bracts hyaline, not colored. . . . . *S. Bartlettii*

Involucre bracts more or less olivaceous.

Sheaths shorter than the leaves, densely short-pubescent; pubescence of the peduncles mostly appressed; bracts as much as 2.5 mm. long, glabrous.

*S. hondurensis*

Sheaths longer than the leaves, loosely long-pilose; pubescence of the peduncles spreading; bractlets as much as 8 mm. long, villous. . . . . *S. Lundellianus*

**Syngonanthus Bartlettii** Moldenke, Phytologia 1: 335. 1938.

British Honduras, endemic, growing in wet flat uplands and in pine ridges; type from Mountain Pine Ridge, El Cayo District, *H. H. Bartlett 11670*.

Plants 2–7 cm. high; leaves cespitose, linear, recurved and appressed to the ground, 3–12 mm. long, obtuse, glabrate or obscurely puberulent; sheaths hirsute; peduncles solitary or few, conspicuously pilose with spreading hairs; heads 2–5 mm. high, the involucre bracts hyaline, colorless, elliptic-lanceolate, acute or acuminate, glabrous; staminate flowers pedicellate, densely long-tomentose at the base; sepals 3, elliptic-obovate, 1 mm. long, acute; petals hyaline, forming a very narrow

tube; pistillate flowers pedicellate, the sepals free, lance-ovate, 1.5 mm. long, acuminate, not ciliate; petals linear-oblong.

**Syngonanthus hondurensis** Moldenke, *Phytologia* 1: 344. 1939.

Known only from the type, wet pine forest, three miles west of Boomtown, Belize District, British Honduras, *H. O'Neill* 8543.

Plants 6–7 cm. high; leaves cespitose, linear, spreading, 10–16 mm. long, 1 mm. wide, glabrate; peduncles 4–5, very slender, white-pilose with usually appressed hairs; flower heads 2–6 mm. wide; involucre bracts elliptic, membranous, olivaceous with scarious margins, 1.5–2.5 mm. long, acute or acuminate, glabrous, not ciliate; staminate flowers pedicellate, the 3 sepals free, 1 mm. long, acute, glabrous; petals united to form a tube about as long as the sepals, glabrous; pistillate flowers pedicellate, the pedicels densely long-villous at the base with white hairs; sepals 3, lanceolate, 1.8 mm. long, acute, long-ciliate, glabrous; petals narrowly oblong, slightly shorter than the sepals, densely long-villous outside with white hairs.

**Syngonanthus Lundellianus** Moldenke, *Phytologia* 1: 345. 1939.

Known only from the type, oak ridges, Broken Ridge, 8 miles northeast of Boomtown, Belize District, British Honduras, *H. O'Neill* 8546.

Plants 6.5–8.5 cm. high; leaves cespitose, linear, 1–1.5 cm. long, spreading, appressed-puberulent; sheaths longer than the leaves, pilose with spreading hairs, acute or subacuminate; peduncles numerous, conspicuously pilose with spreading hairs; flower heads 2–15 mm. wide, the involucre bracts linear-oblong, often elongate to 8 mm., the outer ones or all much shorter, acute, villous on the outer surface; staminate flowers pedicellate, the pedicels villous-tomentose at the base; sepals 3, free, hyaline, elliptic, 1 mm. long, acuminate, glabrous, not ciliate; petals united into a narrow hyaline glabrous tube almost as long as the sepals; pistillate flowers pedicellate, the sepals elliptic, 1.5 mm. long, acute or acuminate, glabrous, not ciliate; petals narrowly oblong, shorter than the sepals, appressed-villous dorsally.

It is stated that the seeds sometimes germinate in the heads, producing small plants that flower while still in the heads—an unusual instance of vivipary.

**Syngonanthus Oneillii** Moldenke, *Phytologia* 1: 346. 1939.

British Honduras; known only from pinelands near Boomtown, Belize District, the type being *H. O'Neill* 8548.

Plants 6–10 cm. high; leaves cespitose, linear, spreading and more or less recurved, 1–2.5 cm. long, 0.5–1 mm. wide, abruptly acute, glabrate or laxly pilose; sheaths equaling or shorter than the leaves, sparsely and laxly pilose or glabrate; peduncles numerous, very slender, glabrous or nearly so; flower heads 3–5 mm. broad, the involucre bracts oblanceolate-elliptic, rather light olivaceous or brownish, abruptly acute or obtuse, glabrous; staminate flowers pedicellate, the pedicels

glabrous except for a few long white hairs at the base; sepals 3, about 1 mm. long, oblanceolate, glabrous, short-acuminate or sinuate-tridentate at the apex; petals united at the middle, free above and below, slightly shorter than the sepals, incurved and pilose at the apex on the outer surface; pistillate flowers pedicellate, the pedicels long-hirsute at the base; sepals 1.2 mm. long, lance-ovate, acute, long-ciliate toward the apex; petals narrowly oblong, connate by their margins.

### TONINA Aublet

Plants probably perennial, with slender elongate stems, these equally leafy throughout; peduncles arising in or near the leaf axils along the stem, the flowers very small, capitate, 3-parted, the receptacle pilose; staminate sepals connate to the middle, the petals connate into a short membranous, shortly 3-lobate tube; stamens 3, the anthers 2-celled; pistillate sepals connate at the base, the petals very small, free, long-pilose; stigmas 3, bifid.

The genus consists of a single species.

**Tonina fluviatilis** Aubl. Pl. Guian. 857. pl. 330. 1775.

Floating in swamp, at sea level, All Pines, Stann Creek District, British Honduras, *W. A. Schipp* 693. Vera Cruz; Costa Rica; West Indies; South America.

Stems often branched, sometimes a meter long, densely leafy; leaves spreading, lanceolate or oblong, 8–15 mm. long, 1–2.5 mm. wide, sessile and amplexicaul, acute, long-ciliate; peduncles numerous, 2–13 mm. long, glabrous; heads echinate-globose, 4–8 mm. in diameter; involucre bracts ovate or obovate, cuspidate, glabrous except at the base and apex; staminate sepals broadly obovate, abruptly acute; petals of the pistillate flower linear.

## BROMELIACEAE. Pineapple Family

By LYMAN B. SMITH

*References:* Mez, Bromeliaceae, Pflanzenreich, fam. 32: 1–667. 1934–5. L. B. Smith, Bromeliaceae, N. Amer. Flora 19: 61–228. 1938. L. B. Smith & C. L. Lundell, Bromeliaceae Yucatan Peninsula, Bot. Maya Area 16: 105–136. 1940.

Herbs in all the Guatemalan species, mostly epiphytic or saxicolous; leaves spirally arranged, usually basal, simple, entire or spinose-serrate, at least in youth bearing peltate scales serving to collect and hold moisture; inflorescence simple or compound, usually bearing brightly colored bracts; flowers perfect or functionally dioecious; perianth heterochlamydeous, the segments free or variously joined, trimerous; stamens 6, filaments free or joined to the petals or to each other; ovary superior to inferior, 3-celled; fruit capsular or baccate; seeds naked, winged, or plumose; embryo small, at the base of the mealy endosperm.



About 45 genera and 1600 species, indigenous to tropical and sub-tropical America except for a single African species.

Ovary wholly or partly superior; fruit capsular; seeds appendaged.

Seeds with entire appendages; leaves often spinose-serrate; ovary often only in part superior; plants usually terrestrial.

Sepals not over 5 mm. long; flowers small and numerous.

Flowers perfect; leaves thin, entire; plants slender, low. . . . . *Lindmania*

Flowers functionally dioecious; leaves thick, spinose-serrate; plants coarse, 1-2 meters high. . . . . *Hechtia*

Sepals 15-50 mm. long; flowers conspicuous. . . . . *Pitcairnia*

Seeds plumose; leaves always entire; ovary nearly or quite superior; plants chiefly epiphytic.

Appendage of the seed basal, straight at maturity.

Petals nearly or quite free.

Petals naked; inflorescence of one or more distichous spikes or rarely simple and polystichous. . . . . *Tillandsia*

Petals each bearing 2 scales on the inner surface. . . . . *Vriesia*

Petals joined or closely agglutinated for most of their length; inflorescence always of polystichous-flowered spikes. . . . . *Guzmania*

Appendage of the seed apical, folded over at maturity; sepals distinctly asymmetric in most species; flowers polystichous. . . . . *Catopsis*

Ovary inferior; fruit baccate; seeds naked; leaves mostly serrate.

Ovaries remaining distinct; inflorescence without a foliaceous coma.

Inflorescences several, axillary, sessile, dense; petals naked, connate by their margins. . . . . *Greigia*

Inflorescence single, central, mostly scapose.

Petals fleshy, 25-40 mm. long, attached to the filament-tube but with free margins; inflorescence sessile or scapose, densely lepidote. . . *Bromelia*

Petals thin; filaments not joined in a tube; inflorescence always scapose.

Sepals soft; petals 4-5 cm. long; pollen without pores, sulcate. . *Billbergia*

Sepals mucronate or pungent or the petals small; pollen with pores or aborted.

Anthers bearing 2 large scales dorsally; petals naked; inflorescence compound; flowers sessile, subfasciculate or laxly polystichous.

*Androlepis*

Anthers naked.

Inflorescence densely bipinnate with strobilate spikes; floral bracts entire; flowers compressed; epigynous tube lacking. *Hohenbergia*

Inflorescence either simple or laxly compound or if densely bipinnate then the floral bracts serrate or the flowers distichous. . *Aechmea*

Ovaries fusing to form a compound fruit; inflorescence bearing a coma of sterile foliaceous bracts at the apex. . . . . *Ananas*

## AECHMEA R. & P.

Stemless herbs; leaves rosulate; scape usually conspicuous; scape-bracts usually bright-colored; inflorescence various; flowers sessile or rarely pedicellate; sepals usually asymmetric and mucronate; petals free, each bearing 2 scales or folds;

second series of stamens more or less adnate to the petals; pollen-grains with 2 or 4 pores or sometimes aborted.

About 150 species in tropical America.

Flowers slenderly pedicellate.

Sepals 6 mm. long; lower branches of the inflorescence much divided.

*Ae. mexicana*

Sepals 3.5 mm. long; lower branches of the inflorescence simple or slightly divided.....*Ae. Lüddemanniana*

Flowers sessile.

Spikes polystichous-flowered.

Inflorescence amply paniculate, elongate; spikes 4-8-flowered.....*Ae. Iguana*

Inflorescence simple or densely digitate from a few spikes; spikes many-flowered.

Floral bracts serrate, up to 65 mm. long.....*Ae. magdalenae*

Floral bracts entire and short, or wanting.

Sepals unarmed; floral bracts enfolding the ovary, thick...*Ae. bromeliifolia*

Sepals mucronate; floral bracts minute or wanting.....*Ae. nudicaulis*

Spikes distichous-flowered.

Floral bracts alate-decurrent and forming a pouch about the flowers, 10-17 mm. long.....*Ae. tillandsioides* var. *Kienastii*

Floral bracts not at all decurrent, 5-8 mm. long.....*Ae. bracteata*

***Aechmea bracteata*** (Sw.) Griseb. Fl. Brit. W. Ind. 592. 1864.

*Bromelia bracteata* Sw. Prodr. 56. 1788. *Ae. Schiedeana* Schlecht.

Linnaea 18: 437. 1844. *Ae. laxiflora* Benth. Bot. Voy. Sulph. 173.

1846. *Ae. regularis* Baker, Jour. Bot. 17: 229. 1879. *Ae. macracantha*

Brongn. ex André, Ill. Hort. 27: 59. 1880. *Ae. Barleei* Baker,

Gard. Chron. II. 20: 102. 1883. *Ae. isabellina* Baker, Jour. Bot. 28:

305. 1890 (type from Boca del Polochic, Dept. Izabal, *J. D. Smith*

1824). *Izchu, Chuek* (Petén, fide Bartlett); *Ixchu, Tinajero* (Petén, fide Lundell).

Saxicolous or epiphytic in dense masses, forests, especially in rather arid regions, 50-900 meters; Petén; Alta Verapaz; Izabal. Mexico to Colombia.

Plants 5-17 dm. or more high; leaves 3-13 dm. long, their sheaths elliptic, large; scape erect; scape-bracts lanceolate, entire, bright red; inflorescence laxly paniculate; spikes laxly 4-17-flowered, rhachis slender, flexuous; floral bracts broadly ovate, 5-8 mm. long, entire; flowers sessile; sepals asymmetric, 3-4 mm. long; petals 1 cm. long, yellow; ovary subglobose, enlarged in fruit.

The berries are said to be edible. The hollow ellipsoid leaf-rosettes hold water which is useful to travelers in dry areas. The base is sometimes occupied by ants. In British Honduras the species is called "wild pine," but this name is applied to almost any conspicuous bromeliad.

***Aechmea bromeliifolia*** (Rudge) Baker in Benth. & Hook. Gen. Pl. 3: 664. 1883. *Tillandsia bromeliifolia* Rudge, Pl. Guian. 32. 1807.

Rare epiphyte in forests; Petén (Uaxactún; Xaxha-Remate road). Not known in North America except in Guatemala and British Honduras; in South America from Colombia, Venezuela, and eastern Brazil to northern Argentina.

Plant 7–9 dm. high; leaf-sheaths large, forming a tube, blades 4–9 cm. wide, laxly serrate; scape white-lanate, its bracts large, lance-ovate, entire, thin; inflorescence simple, strobilate, 15 cm. long, 3–4 cm. thick, densely white-lanate; floral bracts reniform, unarmed, bicarinate; sepals suborbicular, 7 mm. long, exceeding the floral bracts; petals 15 mm. long, soon black, bearing 2 fimbriate scales.

***Aechmea Iguana*** Wittm. Bot. Jahrb. 14: Beibl. 32: 3. 1891.

Known only from the type, *Bernoulli & Cario 695*, from Quezaltenango (Costa Cuca, between Cavallo Blanco and Ocos).

Leaves unknown; scape-bracts laxly serrate; inflorescence amply paniculate; primary bracts lance-oblong, 15–18 cm. long, 40–45 mm. wide, serrate toward base; branches 10–12 cm. long; spikes short, 4–8-flowered; floral bracts triangular-ovate, mucronate, 10–12 mm. long; flowers polystichous, sessile; sepals lanceolate, 15 mm. long including the 5 mm. mucro; petals 15 mm. long, bearing 2 subdentate scales above the base; stamens included; ovary 15 mm. long, 8–10 mm. in diameter.

I have seen nothing but the description of this species and am not even sure that it belongs in *Aechmea*. However, the description is sufficient to indicate that the species is distinct from all other bromeliads known from Guatemala.

***Aechmea Lüddemanniana*** (K. Koch) Brongn. ex Mez, Pflanzenreich IV. 32: 120. 1934. *Pironneava Lüddemanniana* K. Koch, Wochenschr. Gärtn. 9: 182. 1866. *Lamprococcus caeruleus* Regel, Acta Hort. Petrop. 1: 93. 1871. *Aechmea caeruleus* Baker, Jour. Bot. 17: 227. 1879.

Terrestrial or epiphytic in forest, 270–870 meters; Alta Verapaz (Finca Chamá, valley of Río Seniso, *L. C. Stuart 24*). Vera Cruz; British Honduras.

Plant 25–70 cm. high; leaves nearly straight, 3–6 dm. long, sheaths large, elliptic, blades ligulate, 4–7 cm. wide, spines 1–2 mm. long; scape erect, slender, scape-bracts imbricate, elliptic to linear-lanceolate, entire, membranaceous; inflorescence amply compound, cylindric to slenderly pyramidal, 12–30 cm. long, white-farinose; primary bracts narrow, mostly shorter than the branches; racemes laxly few-flowered; floral bracts filiform, usually shorter than the pedicels; pedicels slender, 6 mm. long, divergent; sepals asymmetric, mucronate, 3.5 mm. long; petals 9 mm. long, rose and blue; ovary 6 mm. long; berry 12 mm. long, bluish white.

Called “wild pine” and “gallinasco” in British Honduras.



**Aechmea magdalenae** (André) André ex Baker, Handb. Bromel. 65. 1889. *Chevalliera Magdalenae* André, Enum. Bromél. 3. 13 Dec. 1888; Rev. Hort. 60: 563. 16 Dec. 1888. *Bromelia Magdalenae* C. H. Wright, Kew Bull. 1923: 267. 1923. *Ananas magdalenae* Standl. ex Standl. & Cald. Lista Prelim. Pl. S. Salvador 45. 1925. *Silkgrass*; *Pita floja* (Alta Verapaz, Central America, fide Standley); *Pita* (Petén, fide Bartlett); *Piñuela* (Petén, fide Standley); *Mau* (Quechí). Figure 65.

Terrestrial in forests and thickets, usually below 500 meters; Petén (Tikal). Mexico to Ecuador, the species described from the Río Magdalena in Colombia.

Plant 10–15 dm. high; leaves coarse, up to 2 meters long, blades linear, 5–10 cm. wide, often bright red (Standley), laxly serrate with curved teeth 5 mm. long; scape stout, its bracts foliaceous, the upper ones massed below the inflorescence and reflexed; inflorescence of a few sessile globose spikes in a dense mass or rarely simple; floral bracts recurving, acuminate, 65 mm. long, densely serrate, thick, coriaceous; flowers sessile, 5 cm. long; sepals triangular, unequal, 35–38 mm. long; petals 4 cm. long; ovary elliptic, complanate.

According to Standley this species is common in the North Coast (Izabal) and lowlands of Baja Verapaz, apparently also in lowlands of northern Huehuetenango. Large amounts of the fiber are said to be separated in northern Huehuetenango. It is cultivated occasionally for ornament or as a curiosity in Guatemala City and probably elsewhere. The leaves are retted in water, and fiber is usually extracted by pounding them on stones in running water. It is a very fine and tough fiber, much used for hammocks, bags and string.

**Aechmea mexicana** Baker, Jour. Bot. 17: 165. 1879. *Ae. Bernoulliana* Wittm. Bot. Jahrb. 14: Beibl. 32: 1. 1891.

Epiphytic in forests, 250–1300 meters; San Marcos. Vera Cruz; Costa Rica; Ecuador.

Plants often over a meter high; leaves many in a utriculate rosette, blades ligulate, 6–12 cm. wide, serrate; scape stout; scape-bracts narrowly lanceolate, entire, stramineous; inflorescence amply paniculate, furfuraceous; racemes laxly few-flowered, floral bracts much shorter than the pedicels, filiform; pedicels 4–16 mm. long; sepals strongly asymmetric, mucronate, 6 mm. long; petals 10–15 mm. long, red or lilac; ovary 6 mm. long, often enlarging in fruit.

**Aechmea nudicaulis** (L.) Griseb. Fl. Brit. W. Ind. 593. 1864. *Bromelia nudicaulis* L. Sp. Pl. 286. 1753. ?*Tillandsia serrata* Sessé & Moc. Fl. Mex. ed. 2. 81. 1894.

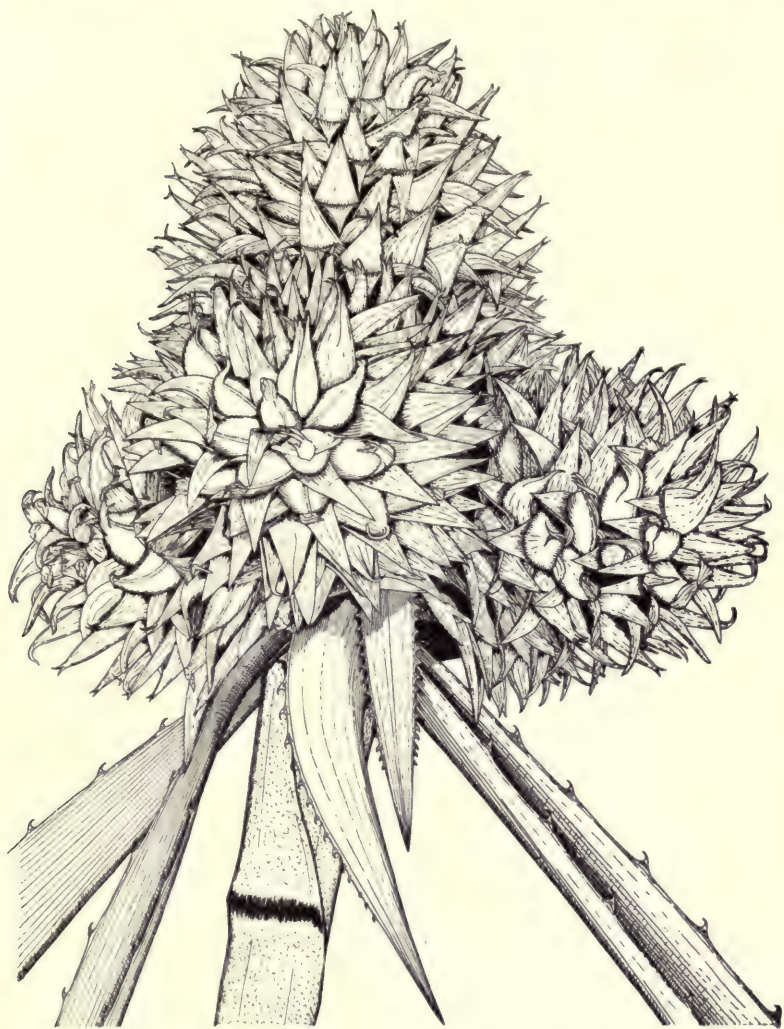


FIG. 65. *Aechmea magdalenae*. Inflorescence and upper part of scape ( $\times \frac{2}{5}$ ).

Epiphytic in forests, 20–1050 meters; southern Mexico to Panama; West Indies; a variety in South America; probably extending into Guatemala although not recorded yet.

Plant very variable in proportions, 3–7 dm. high; leaves densely fasciculate, 3–10 dm. long, sheaths large, elliptic, dark, forming an urceolate pseudobulb, blades ligulate, broadly obtuse and apiculate, 6–10 cm. wide, densely pale-lepidote beneath, armed with coarse black teeth to 4 mm. long; scape slender, white-floccose; scape-bracts imbricate, congested below the inflorescence, elliptic, entire, red; in-

florescence spicate, fertile throughout, 5-25 cm. long; floral bracts small or sometimes wanting, entire; flowers 22 mm. long; sepals free, very asymmetric, mucronate, 5-10 mm. long; petals 12 mm. long, yellow, bearing 2 fimbriate scales; ovary subglobose.



FIG. 66. *Aechmea tillandsioides* var. *Kienastii*. Portion of scape and inflorescence and apex of leaf ( $\times \frac{1}{2}$ ).

***Aechmea tillandsioides*** (Mart.) Baker var. ***Kienastii*** (E. Morr. ex Mez) L. B. Smith, *Caldasia* 5: 5. 1942. *Ae. Kienastii* E. Morr. ex Mez in DC. Monog. Phan. 9: 243. 1896. *Ae. squarrosa* Baker, *Jour. Bot.* 28: 305. 1890 (type from Boca de Polochic, Dept. Izabal, *J. D. Smith 1823*), not Baker, 1889. *Pie de gallo* (Petén); *eck* (Alta Verapaz). Figure 66.

Epiphytic in forests, up to 300 meters; Petén; Alta Verapaz; Izabal. Southern Mexico; Central America; Colombia; Amazon Basin. The typical variety is in Colombia, the Amazon Basin and Guiana.



Leaves 5-9 dm. long with serrate blades 10-65 mm. wide; scape short, its bracts remote, lanceolate, red, serrate; inflorescence simple or digitate (pinnate in the typical variety), white-floccose at first; spikes oblong, 4-11 cm. long; rhachis excavated; floral bracts distichous, imbricate, 10-17 mm. long, convex, nerved; sepals asymmetric, 7-10 mm. long; petals dark purple.

### ANANAS Mill.

Plant stemless, not stoloniferous; leaves densely rosulate, scarcely enlarged at base; scape evident, erect; inflorescence densely strobiliform, crowned with a tuft of sterile foliaceous bracts, frequently producing slips at its base; flowers sessile; sepals free, obtuse, slightly asymmetric; petals free, erect, violet or red, each bearing 2 slenderly infundibuliform scales; stamens included; pollen-grains ellipsoid with 2 pores; ovaries coalescing with each other and with the bracts and axis to form a fleshy compound fruit, epigynous tube short; ovules borne near top of cell.

At least four species and numerous cultivated forms. The genus is a native of Brazil and Paraguay but has been so widely cultivated even before the discovery of America that its natural limits are difficult to define.

**Ananas comosus** (L.) Merrill, Interpr. Rumph. Amboin. 133. 1917. *Bromelia Ananas* L. Sp. Pl. 285. 1753. *B. comosa* L. Herb. Amboin. 21. 1754. *Ananassa sativa* Lindl. Bot. Reg. 13: under *pl. 1068, nomen nudum*. 1827. *Ananas sativus* Schultes in R. & S. Syst. Veg. 7: 1283. 1830. *A. Ananas* Voss. in Vilm. Blumeng. ed. 3. 1: 964. 1895. *Piña; Pine; Pineapple; Chop* (Quecchí, Poconchí, Cacchi-quel). Figure 67.

Leaves coarsely and laxly spinose-serrate; scape short, stout; scape-bracts serrate; inflorescence large, many-flowered; floral bracts soon exposing the tops of the ovaries, relatively inconspicuous, weakly serrulate or entire; syncarp well over 15 cm. long at maturity with copious palatable flesh; seeds lacking or very rare.

Native of southern Brazil and Paraguay, but now cultivated in most tropical regions throughout the world. Standley notes that the date of its introduction into Guatemala is unknown, but probably it was brought up from South America along the Atlantic coast by the Caribs, like yuca (mandioca). Grown commonly in Guatemala from about 1500 meters down to sea level, but much more common at low elevations, especially along the Pacific plains. Large amounts of fruit are carried up into the higher mountains for sale in the markets. Ordinarily the fruits sell at 3-6 cents each, but about Cobán fairly good ones are sometimes offered as low as one cent. The plants have run wild in some places, especially about Puerto Barrios (Izabal), but the wild plants do not produce fruits fit to eat as a rule. The sprout shoots, while young and relatively tender, are cooked and

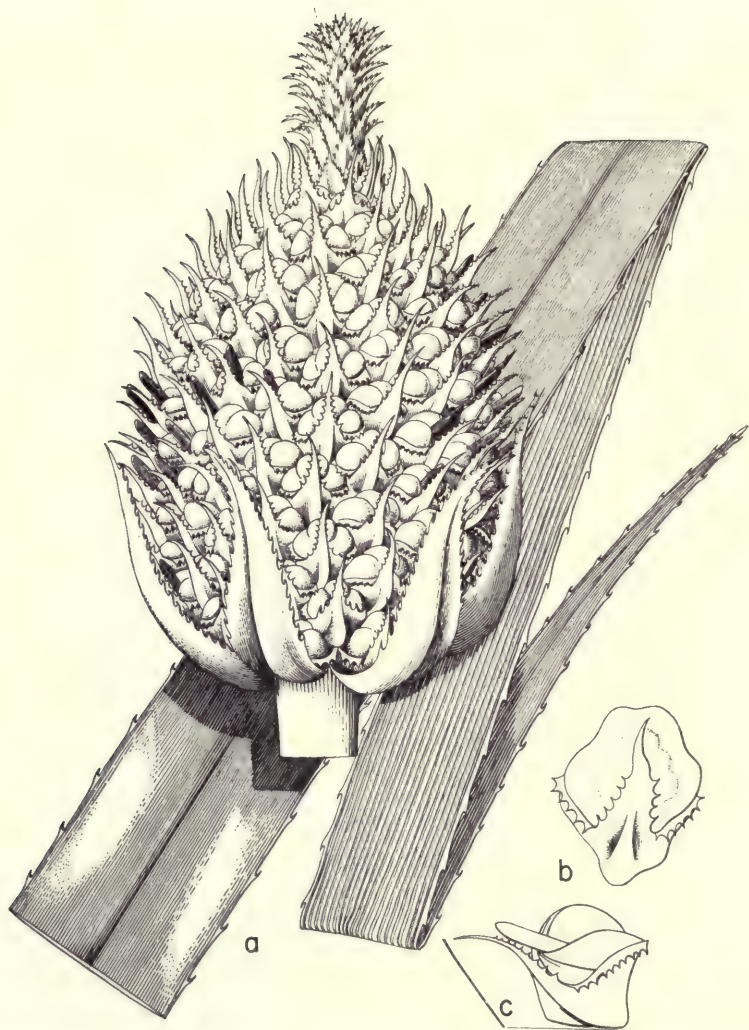


FIG. 67. *Ananas comosus*. *a*, Inflorescence and leaf ( $\times \frac{1}{2}$ ). *b*, Floral bract with ovary ( $\times 1$ ). *c*, Floral bract with ovary, side view ( $\times 1$ ).

eaten commonly. They are called "hijos de piña." Bunches of such sprouts often are offered for sale in the markets of the Oriente, particularly at Zacapa and Jutiapa.

### ANDROLEPIS Brongn. ex Houllet

Large showy herbs; leaves rosulate, spinose-serrate; scape central, erect; inflorescence compound with simple reduced or divided branches; spikes polystichous-flowered; flowers sessile, perfect; sepals free, asymmetric, mucronate; petals short-connate, naked; stamens included, filaments short, adnate; anthers bearing 2 foliaceous appendages at apex; ovary wholly inferior, epigynous tube short; ovules numerous, borne along the upper part of the cell, acute.

The genus consists of the two species noted here.

Branches of the inflorescence well developed and the lower ones often divided.

*A. Donnell-Smithii*

Branches of the inflorescence very short; flowers subfasciculate. . . . . *A. Skinneri*

**Androlepis Donnell-Smithii** (Baker) Mez in DC. Monog. Phan. 9: 161. 1896. *Aechmea Donnell-Smithii* Baker, Jour. Bot. 28: 305. 1890.

Terrestrial in coastal woods, sea level to 75 meters; Izabal (type from Livingston, Río Dulce, *J. D. Smith* 1825). Honduras; Costa Rica.

Plant over 1 meter high; leaves erect, stiff, 0.5 to over 1 meter long, sheaths elliptic, entire, blades ligulate, acute or acuminate, 4–8 cm. wide, flat with involute-pungent apex, densely serrate with spines to 3 mm. long, glabrous above, finely pale-lepidote between the nerves beneath; scape 1 cm. or thicker, buff-furfuraceous; scape-bracts lanceolate, acute, densely imbricate, membranaceous toward base, thick coriaceous toward apex, pungent, pale-lepidote; inflorescence amply compound, usually dense, narrowly pyramidal or cylindric, furfuraceous; primary bracts linear, membranaceous, deflexed, the upper much reduced; branches spreading, well developed, the lowest usually divided; spikes usually lax, longer than broad, 4–5-flowered; floral bracts minute, shorter than the ovary, acuminate, pungent; flowers suberect, to 14 mm. long; sepals broadly triangular with a large wing, 5–6 mm. long, coriaceous, soon glabrous; petals elliptic, 1 cm. long; stamens included; ovary usually not much enlarged in fruit.

Steyermark notes that this species grows just inside the border of the woods above the beach. Called "gallinazo" in Honduras.

**Androlepis Skinneri** (K. Koch) Brongn. ex Houllet, Rev. Hort. 42: 12. 1870. *Pothuava Skinneri* K. Koch, Wochenschr. Gärt. 4: 190. 1861 (based on plants of unknown origin cultivated in Germany). *Billbergia Skinneri* K. Koch, l.c. *Aechmea leucostachys* Baker, Handb. Bromel. 39. 1889. *Ae. Skinneri* Baker, op. cit. 49. Figure 68.





FIG. 68. *Androlepis Skinneri*. *a*, Habit ( $\times 1/5$ ). *b*, Appendaged anther, ventral view ( $\times 8$ ). *c*, Appendaged anther, dorsal view ( $\times 8$ ). *d*, Longitudinal section of flower ( $\times 2$ ).

On rocks or epiphytic in forests, usually forming large masses on trunks or in crotches of trees, at low altitudes; Petén (La Libertad, *Lundell 2605, 2986*). British Honduras.

Leaves 6 dm. long, sheaths large, suborbicular, blades ligulate, 5–8 cm. wide, finely pale-lepidote beneath, densely serrulate; scape 3 dm. long, stout; scape-bracts imbricate, acute, serrulate, stramineous; inflorescence lax, subcylindric, 2 dm. long; primary bracts narrowly triangular, entire; spikes suberect, 1–5-flowered; floral bracts minute or wanting; sepals 5 mm. long; petals elliptic, 1 cm. long, flavous; ovary stout, much enlarged in fruit.

### BILLBERGIA Thunb.

Plants stemless; leaves rosulate or rarely fasciculate, sheaths large, blades mostly ligulate, spinose-serrate, often banded; scape erect or arching; scape-bracts red, membranaceous; inflorescence simple or compound; flowers large, showy, sessile or pedicellate; sepals free, erect; petals free, bearing 2 scales on the inner surface near the base, the claw long, the blade narrow; stamens exerted at anthesis, both series free or the second adnate to the petals up to the scales, pollen-grains with longitudinal folds when dry but no pores; style exceeding the stamens, epigynous tube large, ovules many.

About 50 species, the great majority of which are native to eastern Brazil; the remainder are in Mexico, Central America, Trinidad, and Venezuela and Colombia to northern Argentina.

Flowers sessile; floral bracts suborbicular. . . . . *B. pallidiflora*  
Flowers slenderly long-pedicellate; floral bracts narrowly triangular. . . . . *B. viridiflora*

**Billbergia pallidiflora** Liebm. Ind. Sem. Hort. Haun. 1854: 26. 1854; Ann. Sci. Nat. IV. 2: 373. 1854.

Oak-pine woods, 1200–1500 meters; Zacapa (along upper reaches of Río Sitio Nuevo, between Santa Rosalía and first waterfall, *Steyermark 42264*). Mexico; Nicaragua.

Leaves tubular-rosulate, 6 dm. long, blades ligulate, acute, 45 mm. wide, spinose-serrate; scape arching; scape-bracts densely imbricate, lance-elliptic, over 15 cm. long; inflorescence simple, densely cylindric, many-flowered, 2 dm. long, densely white-farinose; floral bracts much shorter than the ovary; sepals ovate-oblong, broadly acute and apiculate, unequal, 9–12 mm. long; petals linear, acute, to 52 mm. long, green, imperfectly revolute; ovary slenderly ovoid, 12–18 mm. long, coarsely sulcate with the ridges soon glabrous, epigynous tube narrow, 6 mm. long.

**Billbergia viridiflora** H. Wendl. Allg. Gartenz. 22: 154. 1854. Figure 69.

On rocks and epiphytic in forests, at low elevations; Petén; Alta Verapaz; Izabal. Tabasco; British Honduras.

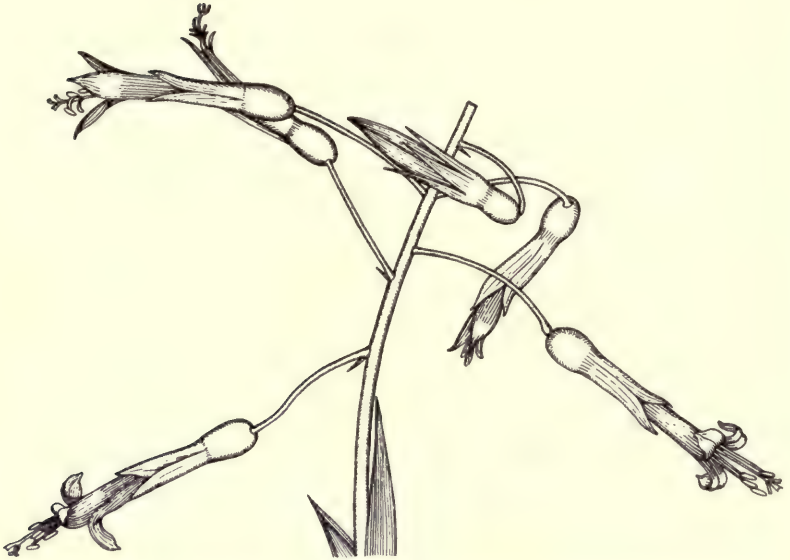


FIG. 69. *Billbergia viridiflora*. Portion of scape and inflorescence ( $\times \frac{1}{2}$ ).

Leaves 12–15 in a tubular rosette, green, minutely white-lepidote, sheaths narrow, entire, blades ligulate, acuminate, 4–9 cm. wide, teeth 1–4 mm. long; scape suberect to arching, slender, about equaling the leaves; scape-bracts imbricate, up to 14 cm. long, serrulate; inflorescence simple, lax, 2–5 dm. long; floral bracts narrow, to 2 cm. long; pedicels spreading, slender, up to 5 cm. long; flowers glabrous; sepals acuminate, 21 mm. long, green; petals 4–5 cm. long, acute, green, bearing 2 subentire scales at base; ovary ellipsoid, green.

## BROMELIA L.

Coarse terrestrial herbs, spreading by rhizomes; leaves usually rosulate, with large curved spines along the margin; inflorescence sessile or stipitate, always compound; sepals free or somewhat united, obtuse or acute, rarely mucronulate; petals rarely with a definite claw, centrally united by the filaments but their margins free, naked, fleshy in most species; stamens included, the filaments forming a tube for part of their length, anthers narrow, acute; ovary passing gradually into the thick pedicel, epigynous tube conspicuous to nearly lacking; berry succulent, relatively large; seeds few to many, flattened.

Nearly 40 species in tropical America.

Inflorescence an elongate lax panicle, terminating a definite scape.

Floral bracts and sepals subulate; petals densely white-tomentose toward apex.

*B. Pinguin*

Floral bracts and sepals triangular; petals sparsely lepidote to glabrous toward apex. . . . . *B. sylvestris*



Inflorescence a densely capituliform panicle, scapeless and sunk in the center of the leaf-rosette.

Filament-tube over 2 cm. long; indument of very coarse black-brown scales.

*B. Karatas*

Filament-tube not over 12 mm. long; indument of fine buff or white scales.

*B. Wercklei*

**Bromelia Karatas** L. Sp. Pl. 285. 1753. *Karatas Plumieri* E. Morr. Belg. Hort. 22: 131. 1872. *Cham, Chom* (Petén, Maya); *Piñuela* (Petén, Huehuetenango); *Piña* (Alta Verapaz). Figure 70, c, d.

In marginal forests bordering savannas and in deciduous forests, 1300–1500 meters; Petén; Alta Verapaz; Sacatepéquez; Huehuetenango. Mexico and the West Indies to Ecuador and Brazil.

Rosette up to 3 meters in diameter, leaf-sheaths large, covered with long coarse dark brown scales, blades 3–5 cm. wide, minutely lepidote beneath, teeth coarse, 5–8 mm. long; inflorescence a many-flowered capituliform panicle, flat-topped, surrounded by the red inner leaves; primary bracts foliaceous; floral bracts narrow, oblanceolate, thin, coarsely lepidote; flowers 6–9 cm. long; pedicels short, stout; sepals lanceolate, acute, lepidote; petals 4 cm. long, glabrous, rose with white base and margins; ovary lepidote; berry fusiform, 8 cm. long, 2 cm. thick, acid, edible.

According to Standley the species is much planted in hedges in Guatemala, and is common about Antigua (Sacatepéquez, 1500 meters) and other places of lower elevation. Sometimes called “piñuela de cabeza de negro” in Guatemala. Flowering and fruiting in the rainy season. The handsome heads of flowers and fruits are often sold in the markets for use in decorating *nacimientos* and altars. In El Salvador the ripe fruits of this species or the closely allied *B. Wercklei* are cooked with sugar and used to make the beverage *Atol de piña* or *Atol de piñuela*. The young shoots are called *pollas* there; they are cooked in soup, fried with eggs, and used in other ways for food. The young inflorescences are known there as *motates*.

**Bromelia Pinguin** L. Sp. Pl. 285. 1753. *Piñuela*; *Ixchuu* (Petén, Maya). Figure 70, a.

Common and widely distributed in the lowlands of Guatemala, mostly or wholly at 1100 meters or lower. Known definitely (according to field and other records) from Petén; Baja Verapaz; Zacapa; Chiquimula; El Progreso; Guatemala; Escuintla; Jutiapa; Quezaltenango; probably in all the lowland departments.

Plant 1 meter high; leaves many, over 2 meters long, sheaths broad, tomentose-lepidote, blades 4 cm. wide, deep green above, pale-lepidote beneath, teeth 10 mm.

long; scape stout, white-floccose; scape-bracts subfoliaceous, reddish; inflorescence narrow, white-floccose; primary bracts like the scape-bracts; floral bracts linear-subulate, 3 cm. long; flowers 6 cm. long; sepals triangular-subulate, pale; petals narrow, 3 cm. long, rose with white base and margins, densely white-tomentose toward apex; berry yellow, very acidulous, aromatic, edible.

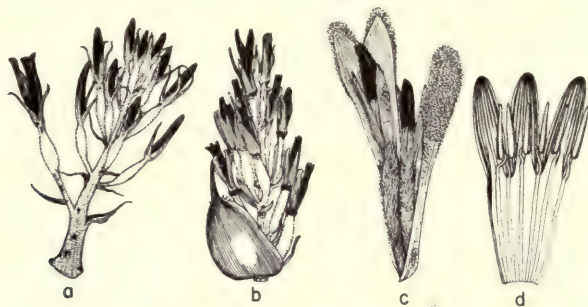


FIG. 70. *a*, *Bromelia Pinguin*, branch of inflorescence ( $\times \frac{1}{3}$ ). *b*, *B. sylvestris*, branch of inflorescence and primary bract ( $\times \frac{1}{3}$ ). *c*, *d*, *B. Karatas*: *c*, flowers ( $\times \frac{1}{3}$ ); *d*, corolla cut open ( $\times \frac{2}{3}$ ).

Known in Yucatan by the Maya names "tsalbay," "cham," "chom" and "hman." In Guatemala young shoots are called "hijos de piña." The plant often forms wide and dense thickets on the plains of the Pacific coast and all through the lower Motagua Valley. It is much planted for hedges, even in regions where it is not native. The young inflorescences are called "mutas" in Guatemala. The "hijos" are much used as food in all the dryer regions. They can be had when ordinary vegetables are scarce or unobtainable, as at the end of the dry season. The fruit is intensely sour and acrid. It is sometimes used for making vinegar.

***Bromelia sylvestris*** Willd. ex Link, Enum. 1: 308. 1821.  
Figure 70, *b*.

Arid woodlands, at low elevations; Vera Cruz; Yucatan; Honduras; probably extending into Guatemala.

Flowering plant nearly 1 meter high; leaves many, about 1 meter long, sheaths large, white-lepidote, blades glabrous and lustrous above, densely pale-lepidote beneath, teeth 5 mm. long; scape stout, white-floccose; scape-bracts subfoliaceous, reddish; inflorescence narrow, white-floccose; primary bracts like the scape-bracts; floral bracts narrowly triangular, flat, thin; flowers 5 cm. long; sepals lance-triangular, acute or obtuse, 15–18 mm. long; petals lanceolate, obtuse, 25 mm. long, blue or rose with white margins, glabrous or sparsely lepidote at apex, connate for only 3 mm. with the filament-tube.

Some of the supposed records of the closely allied *B. Pinguin* may represent this species.

**Bromelia Wercklei** Mez, Repert. Sp. Nov. 16: 2. 1919.

From 40 to 1500 meters; Mexico; El Salvador; Nicaragua; Costa Rica; probably extending into Guatemala.

Leaves 1–2 meters long, sheaths densely pale-tomentose-lepidote on both sides, blades linear, 3–4 cm. wide, acuminate, laxly serrate with teeth 7 mm. long; inflorescence many-flowered, dense, sunk in the center of the leaf-rosette, densely lepidote with fine elongate buff scales; primary bracts large with very broadly ovate base and long foliaceous blade; floral bracts narrowly oblanceolate, 45 mm. long, the upper half coarsely lacinate-serrate; flowers to 6 cm. long; sepals oblong, entire, acute, 24 mm. long; petals ligulate, acute, 3 cm. long, connate for 12 mm. with the filament-tube, fleshy, glabrous or slightly puberulous toward the apex; ovary 25 mm. long.

Cultivated as a hedge. The acid fruits are used in soft drinks. Called “piñuela casera” in Costa Rica, “piña de cerco” in El Salvador and “piñuela” and “timbiriche” in Mexico. It is not always certain whether records apply to this species or to the closely allied and better known *B. Karatas*.

### CATOPSIS Griseb.

Stemless herbs; leaves utriculate-rosulate with large sheaths, minutely lepidote, green; scape evident; inflorescence usually compound; flowers polystichous, usually sessile, perfect or functionally dioecious; sepals free, glabrous, usually asymmetric; petals free, naked; stamens included; ovary superior, style very short or none; seeds with an apical folded coma.

Twenty-five species in Florida, Mexico, Central America, the West Indies and northern South America.

Flowers slenderly pedicellate.....*C. pedicellata*

Flowers sessile or subsessile.

Sepals 10–18 mm. long.

Floral bracts exceeding the sepals.

Floral bracts cucullate; inflorescence pendulous or erect; flowers perfect.

*C. cucullata*

Floral bracts straight toward apex; inflorescence erect; flowers dioecious.

*C. triticea*

Floral bracts shorter than the sepals, straight toward apex.

Sepals subsymmetric, 15–18 mm. long.....*C. Wawraea*

Sepals distinctly asymmetric, 10–15 mm. long.

Petals bright yellow, much exceeding the submembranaceous sepals; scape slender, usually decurved.....*C. nutans*

Petals white, equaling or shorter than the coriaceous sepals; scape erect, stout.....*C. Berteroniana*



Sepals not more than 9 mm. long.

Scape-bracts all shorter than the internodes.

Sepals not over 4.5 mm. long; inflorescence delicate with very slender axes; leaves mostly 10–15 cm. long. . . . . *C. apicroides*

Sepals 5–9 mm. long.

Leaves in a cylindric rosette, usually strict; sepals cuneate on the right with the wing much exceeding the midnerve, 5–6 mm. long.

*C. nitida*

Leaves in a crateriform rosette, arching-divergent; sepals curved on both sides of the base with the wing scarcely if at all exceeding the midnerve, 7–8 mm. long.

Flowers perfect, suberect; capsule short-beaked. . . . . *C. sessiliflora*

Flowers dioecious, spreading; capsule beakless. . . . . *C. aloides*

Scape-bracts equaling or exceeding the internodes, or rarely the uppermost slightly shorter.

Inflorescence pendulous, 3–5 dm. long. . . . . *C. pendula*

Inflorescence erect or somewhat curved but never pendulous.

Floral bracts equaling the sepals. . . . . *C. triticea*

Floral bracts distinctly shorter than the sepals at maturity.

Leaves with conspicuous pale or white margins, 10–18 cm. long.

Leaf-blades narrowly triangular, acuminate. . . . . *C. brevifolia*

Leaf-blades ligulate, broadly acute or obtuse, apiculate.

*C. Morreniana*

Leaves concolorous.

Leaf-blades 10–45 mm. wide.

Spikes dense or subdense.

Lower primary bracts more than half as long as the axillary branches, usually exceeding them, ample, bladeless.

*C. Hahnii*

Lower primary bracts much shorter than the axillary branches, laminate.

Spikes short-stipitate, spreading, very dense. . . . . *C. subulata*

Spikes long-stipitate, strict, subdense. . . . . *C. floribunda*

Spikes lax.

Branches of the inflorescence strict; spikes long-stipitate.

*C. floribunda*

Branches of the inflorescence divergent to spreading; spikes short-stipitate.

Lower primary bracts nearly equaling the usually simple branches. . . . . *C. delicatula*

Lower primary bracts mostly shorter than the sterile bases of the usually divided branches. . . . . *C. montana*

Leaf-blades not over 5 mm. wide; primary bracts much shorter than the sterile bases of the spikes.

Leaf-sheaths conspicuous, large. . . . . *C. juncifolia*

Leaf-sheaths inconspicuous, narrow. . . . . *C. Lundelliana*

**Catopsis aloides** (Schlecht. & Cham.) Baker, Handb. Bromel. 154. 1889. *Tillandsia aloides* Schlecht. & Cham. Linnaea 6: 55. 1831.

Epiphytic in forest, 100–600 meters; Petén; Alta Verapaz; Huehuetenango. Southern Mexico; British Honduras.

Plant 14–46 cm. high; leaves few in a slenderly crateriform rosette, to 25 cm. long, sheaths inconspicuous, about as long as the blades, blades ligulate, broadly acute or obtuse, apiculate, 23 mm. wide; scape erect or arching, slender, angled or narrowly winged; scape-bracts erect, remote, broadly elliptic-ovate; inflorescence simple or laxly compound from 2–4 spikes, to 15 cm. long, glabrous; primary bracts like the scape-bracts, usually shorter than the sterile bases of the branches; spikes dense except toward base, 3–13 cm. long; floral bracts ovate, obtuse, much shorter than the sepals, thin, nerved; flowers spreading, dioecious; sepals asymmetric, broadly subelliptic, 8 mm. long; petals slightly exserted, yellow; capsule ovoid, acute but not beaked, 10–15 mm. long.

**Catopsis apicroides** (Schlecht. & Cham.) Baker, Jour. Bot. 25: 174. 1887. *Tillandsia apicroides* Schlecht. & Cham. Linnaea 6: 55. 1831. Figure 71.

Epiphytic in forests, 1–1140 meters; Izabal. Southern Mexico; Central America.

Plants 12–45 cm. long; leaves few, their blades ligulate, 10–25 mm. wide, the inner rounded-apiculate; scape more or less curved, very slender; scape-bracts remote; inflorescence compound, lax; primary bracts very short; spikes many-flowered, 2–11 cm. long; floral bracts equaling or shorter than the sepals; flowers dioecious; sepals asymmetric, 4.5 mm. long; petals 6 mm. long, yellow.

**Catopsis Berteroniana** (Schultes) Mez in DC. Monog. Phan. 9: 621. 1896. *Tillandsia Berteroniana* Schultes in R. & S. Syst. 7: 1221. 1830.

Epiphytic in thickets and forests, at low altitudes; Petén (La Libertad, *Lundell 2909*). Southern Florida; Bahamas; Cuba; Jamaica; Santo Domingo; British Honduras; Panama; Trinidad; British Guiana; eastern Brazil.

Plant 4–9 dm. high; leaves to 4 dm. long, white-cretaceous, their sheaths very large, blades triangular, 4–5 cm. wide; scape erect, stout; lower scape-bracts imbricate, foliaceous, the upper ovate, often remote; inflorescence usually compound with short, broadly ovate primary bracts; spikes long-stipitate, laxly flowered; floral bracts broad, obtuse, 6–8 mm. long; flowers perfect, suberect; sepals asymmetric, obovate, 10–12 mm. long, equaling or exceeding the white petals.

**Catopsis brevifolia** Mez & Wercklé ex Mez, Bull. Herb. Boiss. II. 4: 1127. 1904.

Epiphytic; Suchitepéquez (Volcán Santa Clara, 1250–2650 meters, *Steyermark 46648*). Costa Rica.

Plant 2–3 dm. high; leaves many in a dense rosette, with or without a cretaceous coat, sheaths large, ovate or elliptic, blades narrowly triangular, acuminate,



FIG. 71. *Catopsis apicroides*. Habit ( $\times \frac{1}{2}$ ).

2 cm. wide, the margin pale; scape erect, slender; scape-bracts suberect, foliaceous, exceeding the internodes; inflorescence laxly and sparsely bipinnate (or the lowest branch divided again); lower primary bracts like the scape-bracts, longer or shorter than the branches, the upper much shorter; spikes subdense, distinctly stipitate; floral bracts broadly ovate, obtuse, shorter than the sepals, nerved; flowers suberect, dioecious, 6–7 mm. long; sepals strongly asymmetric; petals broadly ligulate, slightly longer than the sepals; stamens unequal; ovary pyramidal-ovoid; stigmas subsessile.

I have not seen any material of the type and the immature Guatemalan material is associated with it solely on the basis of the type description.

***Catopsis cucullata*** L. B. Smith, Contr. Gray Herb. 104: 72. 1934. *Chopixul* (fide Standley). Figure 72.

Epiphytic, 1290 meters; Alta Verapaz (Cobán, Johnson 569). Jalapa; Vera Cruz.

Leaves up to 22 cm. long, thin, their sheaths indistinct, blades subtriangular, acute and apiculate, 2 cm. wide; scape erect or decurved; scape-bracts longer than the internodes, ovate, acute; inflorescence simple or few-branched; primary bracts shorter than the spikes; spikes suberect, to 10 cm. long; floral bracts ovate, acute,



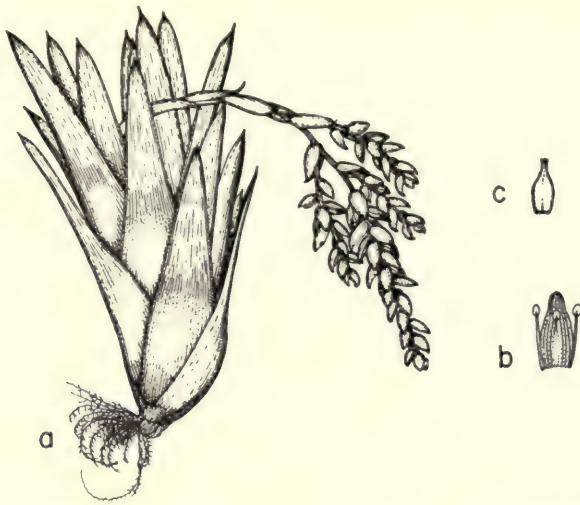


FIG. 72. *Catopsis cucullata*. a, Habit ( $\times \frac{1}{4}$ ). b, Single petal with three stamens shown ( $\times 1$ ). c, Pistil ( $\times 1$ ).

10–15 mm. long, exceeding the flowers, cucullate, thin; flowers perfect, fragrant (fide H. Johnson); sepals asymmetric, obovate, 10 mm. long; petals barely exceeding the sepals.

***Catopsis delicatula*** L. B. Smith, Contr. Gray Herb. 117: 4. 1937.

Epiphytic in forest, 100–670 meters; endemic; Suchitepéquez; Retalhuleu (type from San Felipe, 670 meters, *Rojas 445*).

Immature plant 28 cm. high; leaves few, subfasciculate, their sheaths small and indistinct, blades linear-triangular, acuminate, 12 mm. wide, flat; scape erect, very slender, its bracts erect, narrowly lanceolate, much exceeding the internodes; inflorescence laxly panicate, axis geniculate; lower primary bracts about equaling the young spikes, the upper much reduced; spikes spreading, 4 cm. long, laxly few-flowered; floral bracts ovate, shorter than the sepals of the more mature flowers; flowers spreading; sepals strongly asymmetric, 5 mm. long; petals 6 mm. long.

The very immature state of the known collections of this species make it very difficult to judge what the relative size of parts would be in mature plants. However, the almost filiform tips of the scape-bracts and lower primary bracts are very distinctive.

***Catopsis floribunda*** (Brongn.) L. B. Smith, Contr. Gray Herb. 117: 5. 1937. *Pogospermum floribundum* Brongn. Ann. Sci. Nat. V. 1: 329, nomen provisorium. 1864. *Catopsis nutans* Griseb. as to description and use by later authors, not as to basionym. Figure 73.



FIG. 73. *Catopsis floribunda*. a, Inflorescence and top of scape ( $\times 1$ ). b, Sepal ( $\times 5$ ). c, Floral bract ( $\times 20$ ). d, Apex of leaf ( $\times 1$ ).

Epiphytic in forests, up to 1500 meters; Baja Verapaz; Quezaltenango. Florida; West Indies; British Honduras; Costa Rica; Venezuela.

Plant 4–7 dm. high; leaves many, strict, 2–4 dm. long, their sheaths large, elliptic, blades narrowly triangular, 15–30 mm. wide; scape erect, slender, its bracts imbricate with the lower foliaceous; inflorescence laxly compound, 15–40 cm. long; primary bracts usually shorter than the sterile bases of the branches; spikes subdense or lax; floral bracts ovate, shorter than the sepals; flowers suberect, perfect; sepals 4–6 mm. long, asymmetric; petals 7 mm. long, white.

*Catopsis Hahnii* Baker, Jour. Bot. 25: 175. 1887. *C. Oerstediana* Mez in DC. Monog. Phan. 9: 630. 1896.

Epiphytic in forests, 1300–2500 meters; Alta Verapaz; Chimaltenango; Sololá; Quiché; Huehuetenango; San Marcos. Southern Mexico; Honduras; Nicaragua.

Plant to over 5 dm. high; leaves in a dense subfasciculate rosette, 2–4 dm. long, sometimes white-cretaeous beneath, sheaths elliptic, as long as or longer than the blades, blades triangular, acute or acuminate, 30–45 mm. wide; scape erect or arching; scape-bracts foliaceous, large, densely imbricate; inflorescence densely bipinnate or tripinnate, subthyrsoid, 11–25 cm. long, the staminate with more and smaller flowers; primary bracts suberect, lance-ovate, acuminate, usually exceeding the lower branches; spikes dense; floral bracts ovate-elliptic, obtuse, shorter than the sepals; flowers suberect; sepals asymmetric, pistillate 8–9 mm. long, staminate 6 mm.; petals suborbicular, white, barely exceeding the sepals.

**Catopsis juncifolia** Mez & Wercklé ex Mez, Bull. Herb. Boiss. II. 4: 1124. 1904.

Epiphytic, between 150 and 700 meters; Alta Verapaz (Cerro Chinajá, *Steyermark 45689*). Costa Rica.

Plant 23–27 cm. high; leaves many in a subbulbous rosette, 9–14 cm. long, sheaths large, ovate-elliptic, densely brown-punctulate-lepidote, blades junciform-subulate, acuminate, 5 mm. wide; scape erect, slender; at least the lower scape-bracts exceeding the internodes; inflorescence sparsely bipinnate, lax, strict, composed of a terminal spike of about 10 flowers and 2 long-stipitate few-flowered lateral spikes; primary bracts lance-ovate, acuminate, much shorter than the sterile bases of the spikes; floral bracts broadly ovate, obtuse, much shorter than the sepals; flowers suberect to spreading, dioecious, only the pistillate known; sepals asymmetric, 4–5 mm. long; petals barely exerted; ovary pyramidal.

**Catopsis Lundelliana** L. B. Smith, Contr. Gray Herb. 117: 6. 1937. Figure 74.

Epiphytic in forests, at low elevations; British Honduras (type from Valentin, El Cayo District, *Lundell 6256*); Panama; probably extending into Guatemala.

Plant 25–30 cm. high; leaves many in a dense subglobose rosette, 1 dm. long, densely and obscurely punctulate-lepidote, sheaths narrowly ovate or elliptic, 15–30 mm. long, not inflated, blades linear, acuminate, 5 mm. wide, involute toward apex; scape erect, very slender, glabrous; scape-bracts exceeding the internodes, lanceolate with a long narrow acuminate blade; inflorescence lax, of 3–4 branches, 7–12 cm. long; primary bracts like the upper scape-bracts, shorter than the sterile bases of the branches; spikes divergent, straight, very laxly subtristichous-flowered, to 95 mm. long; floral bracts broadly ovate, obtuse, thin, prominently nerved, much shorter than the sepals; flowers suberect; sepals obovate, obtuse, strongly asymmetric, 5 mm. long; petals barely exerted; style short but distinct.

**Catopsis montana** L. B. Smith, Contr. Gray Herb. 117: 6. 1937.

Epiphytic in oak woods, 1300–1700 meters; Jalapa; Sololá. Cuba.





FIG. 74. *Catopsis Lundelliana*. a, Inflorescence and upper part of scape ( $\times \frac{2}{3}$ ). b, Scape-bract ( $\times \frac{2}{3}$ ).

Plant 5-6 dm. high; leaves many in a cyathiform rosette, 35-45 cm. long, sheaths elliptic, about as long as the blades but indistinct, blades linear-lanceolate, acuminate, to 33 mm. wide; scape erect, slender; scape-bracts erect, the lower sub-foliaceous, imbricate, the upper ovate, acuminate, at least equaling the internodes; inflorescence laxly paniculate with the lower branches divided, 25-30 cm. long; primary bracts like the scape-bracts, much shorter than the divergent to spreading branches; spikes short-stipitate, 3-13 cm. long, laxly many-flowered; floral bracts broadly ovate, much shorter than the sepals, nerved; flowers sessile, subspreading, perfect; sepals elliptic, strongly asymmetric, 6 mm. long; petals slightly exserted; style short but distinct.

**Catopsis Morreniana** Mez in DC. Monog. Phan. 9: 628. 1896.  
*C. Bakeri* Mez, Bull. Torrey Club 30: 435. 1903. Figure 75.

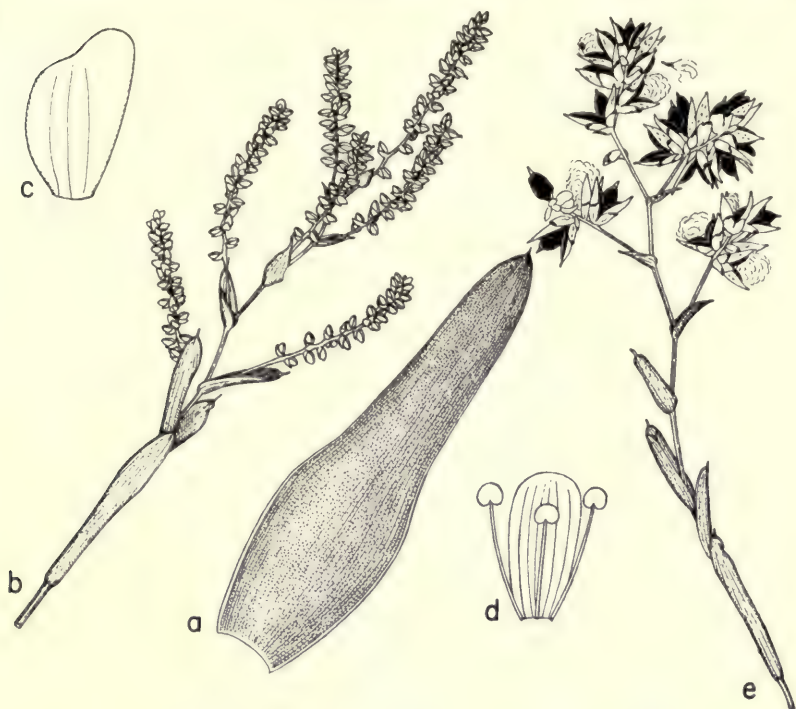


FIG. 75. *Catopsis Morreniana*. a, Leaf ( $\times \frac{1}{2}$ ). b, Inflorescence and upper part of scape ( $\times \frac{1}{2}$ ). c, Sepal ( $\times 5$ ). d, Petal with three stamens in place ( $\times 5$ ). e, Fruiting branch ( $\times \frac{1}{2}$ ).

Epiphytic in forests and terrestrial on open ridges, 20–1650 meters; Petén; Alta Verapaz; Chimaltenango. Southern Mexico; British Honduras; Honduras; Nicaragua; Costa Rica.

Plant 2–4 dm. high; leaves 10–18 cm. long, their blades ligulate, apiculate, 15–25 mm. wide, narrowly white-margined; scape erect, slender, its bracts imbricate; inflorescence laxly compound, 6–17 cm. long, glabrous, stramineous; primary bracts usually shorter than the spikes; spikes stipitate, the staminate many-flowered, up to 7 cm. long, the perfect or pistillate 4–5 cm. long, densely few-flowered; floral bracts ovate, shorter than the sepals; flowers spreading; sepals asymmetric, 3–6 mm. long.

*Catopsis nitida* (Hook.) Griseb. Fl. Brit. W. Ind. 599. 1864. *Tillandsia nitida* Hook. Exot. Fl. pl. 218. 1827. Figure 76.

Epiphytic in forests, 800–1550 meters; Baja Verapaz (Panjal, *Tuerckheim* 3991). Honduras; Costa Rica; Panama; Greater Antilles; Guiana.

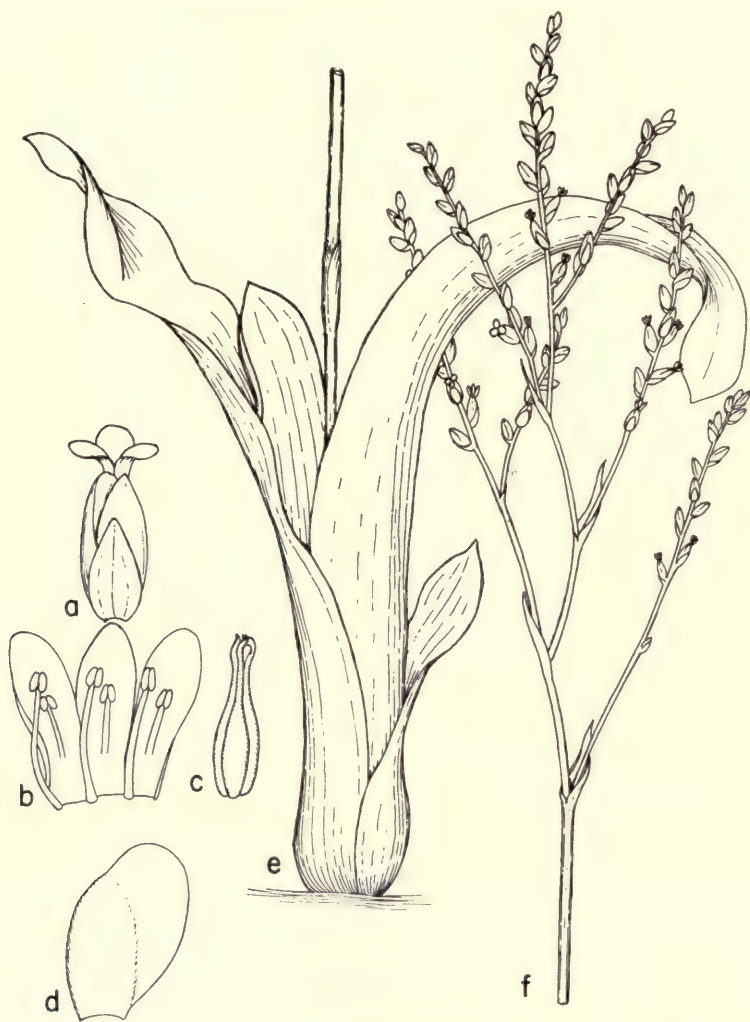


FIG. 76. *Catopsis nitida*. *a*, Flower with floral bract ( $\times 4$ ). *b*, Corolla opened to show stamens ( $\times 4$ ). *c*, Pistil ( $\times 4$ ). *d*, Sepal ( $\times 4$ ). *e*, Leaf-rosette and lower part of scape ( $\times \frac{1}{2}$ ). *f*, Inflorescence and top of scape ( $\times \frac{1}{2}$ ).

Plant to 45 cm. high; leaves few in an elongate cylindrical rosette, to 35 cm. long, sheaths very indistinct, about as long as the blades but scarcely wider, blades ligulate, rounded-apiculate, to 4 cm. wide; scape erect or somewhat curved, slender; scape-bracts remote, lance-ovate; inflorescence laxly compound with simple or rarely divided branches, equaling or exceeding the leaves, 5–20 cm. long; primary bracts lanceolate, much shorter than the sterile base of the spike; spikes divergent, lax; floral bracts broadly ovate, acute, shorter than the sepals; flowers perfect; sepals strongly asymmetric, 5–6 mm. long; petals barely exserted; style lacking.



**Catopsis nutans** (Sw.) Griseb. Fl. Brit. W. Ind. 599. 1864. *Tillandsia nutans* Sw. Prodr. 56. 1788. *T. vitellina* Lk., Kl. & Otto, Ic. Pl. Rar. 101. 1843. *Catopsis fulgens* Griseb. in Nachr. Ges. Wiss. Gött. 1864: 21. 1865. *C. vitellina* Baker, Jour. Bot. 25: 176. 1887. *Gallito quiz* (fide Aguilar). Figure 77.

Epiphytic, 75–1500 meters; Alta Verapaz; Escuintla; Guatemala; San Marcos. Greater Antilles; Vera Cruz to Panama, Venezuela and Ecuador.



FIG. 77. *Catopsis nutans*. a, Flower with bract ( $\times \frac{2}{3}$ ). b, Petal with stamen in position ( $\times \frac{2}{3}$ ). c, Habit ( $\times \frac{1}{3}$ ).

Plant 14–40 cm. long extended; leaves about 10, up to 24 cm. long, sheaths elliptic, blades subtriangular, 25 mm. wide; scape slender, usually decurved, its bracts remote; inflorescence simple or rarely few-branched with very short primary bracts; spikes lax, up to 2 dm. long; floral bracts shorter than the sepals; flowers perfect, erect to spreading; sepals strongly asymmetric, 15 mm. long; petals 2 cm. long, bright yellow.

**Catopsis nutans** var. **robustior** L. B. Smith, Contr. Gray Herb. 154: 34. 1945.

Epiphytic, 1300–1500 meters; endemic; Chiquimula; Quezaltenango (type from between Finca Pirineos and Patzulín, *Standley 87157*).

Scape erect or suberect, to 3 mm. thick; scape-bracts less remote or even slightly imbricate.

**Catopsis nutans** var. **stenopetala** (Baker) L. B. Smith, No. Am. Fl. 19: 193. 1938. *Catopsis stenopetala* Baker, Jour. Bot. 25: 176. 1887 (type from Guatemala without further locality, *Bernoulli & Cario 685*).

Epiphytic, 600–1200 meters; Santa Rosa; Escuintla; Sacatepéquez; Huehuetenango. Southern Mexico; El Salvador.

Flowers functionally dioecious; fruiting pistillate plants indistinguishable from the typical form of the species; staminate plants more delicate with ampler inflorescence, slenderly cylindric calyces and sepals 12 mm. long.

**Catopsis pedicellata** L. B. Smith, Contr. Gray Herb. 154: 34. 1945.

Epiphytic in pine and oak woods, alt. 500–1500 meters; Chiquimula (type and only collection from Cerro Tixixí, 3–5 miles north of Jocotán, *Steyermark 31641*).

Flowering plant to 6 dm. high; leaves many in a cyathiform rosette, to 2 dm. long and 45 mm. wide, subelliptic without a distinct sheath, acute or subacute and apiculate, narrowly pale-margined, glabrous; scape erect, slender; scape-bracts elliptic, acute, erect, all but the uppermost imbricate; inflorescence laxly tripinnate, 19 cm. long; primary bracts ovate, acute, small; branches suberect, lax; floral bracts broadly ovate, barely exceeding the pedicels; pedicels slender and quite distinct, 1–1.5 mm. long; sepals broadly elliptic, obtuse, subsymmetric, 2.5 mm. long, thin; petals 5 mm. long; capsule slender, acute, 12–13 mm. long.

**Catopsis pendula** Baker, Handb. Bromel. 155. 1889.

Terrestrial in swamps, epiphytic in forests, 1300–1575 meters; Alta Verapaz; Baja Verapaz. Southern Mexico; Costa Rica.

Plant up to 1 meter long extended; leaves about 12 in a crateriform rosette, 3–4 dm. long, sheaths large but scarcely distinct from the blades, elliptic, blades triangular, 3–6 cm. wide; scape deflexed, much longer than the leaves, its bracts foliaceous, densely imbricate; inflorescence amply tripinnate, 3–5 dm. long or more; primary bracts like the scape-bracts, barely exceeding the sterile bases of the weak elongate branches; spikes many-flowered, the staminate subdense, 65 mm. long, the pistillate lax, up to 25 cm. long; floral bracts broadly ovate, obtuse, much shorter than the sepals; flowers functionally dioecious, the staminate 7 mm. long, the pistillate up to 12 mm. long; sepals strongly asymmetric, the staminate 5 mm. long, the pistillate 5–9 mm. long; petals exceeding the sepals.

**Catopsis sessiliflora** (R. & P.) Mez in DC. Monog. Phan. 9: 625. 1896. *Tillandsia sessiliflora* R. & P. Fl. Peruv. 3: 42. 1802. *Catopsis nutans* var. *erecta* Wittm. Bot. Jahrb. 11: 71. 1889. *Gallito quiz* (fide Aguilar). Figure 78.

Epiphytic, at very low altitudes; Izabal (vicinity of Quiriguá, 75–225 meters, *Standley 24546*). West Indies; southern Mexico to southern Brazil, Colombia and Peru.

Plant 1–3 dm. high; leaves 4–13 in a slender rosette, 8–20 cm. long, sheaths inconspicuous, about as long as the blades but scarcely wider, blades curving out-



FIG. 78. *Catopsis sessiliflora*. a, Habit ( $\times \frac{1}{2}$ ). b, Sepal ( $\times 2\frac{1}{2}$ ). c, Seed ( $\times 2\frac{1}{2}$ ).



ward, ligulate, rounded and apiculate, 12–25 mm. wide; scape erect, slender; scape-bracts erect, remote; inflorescence simple or compound from a few spikes, lax, to 11 cm. long; primary bracts much shorter than the sterile bases of the spikes; spikes divergent, laxly flowered; floral bracts broadly ovate, obtuse, much shorter than the sepals; flowers suberect, perfect; sepals asymmetric, suborbicular, 7–8 mm. long, thin; petals barely exerted, white; style very short; capsule ovoid, distinctly short-beaked, 12 mm. long.

***Catopsis subulata*** L. B. Smith, Contr. Gray Herb. 114: 5. 1936.

Epiphytic in pine-oak forests, 1300–2000 meters; Baja Verapaz; Huehuetenango. Southern Mexico; Honduras.

Plant 3–6 dm. high; leaves many in an ellipsoid pseudobulb, 15–30 cm. long, sheaths about twice as long as the blades, ample, blades narrowly triangular, acuminate, 1 cm. wide, involute and contorted; scape erect, exceeding the leaves, its bracts imbricate, lanceolate, involute, recurving toward apex; inflorescence compound, rather dense, 6–21 cm. long; primary bracts much shorter than the branches, broadly ovate with an acuminate recurved apex; branches simple or the lowest divided; spikes cylindric, dense, 2–7 cm. long; floral bracts broadly ovate, acute, much shorter than the sepals, thin; flowers functionally dioecious, suberect; sepals strongly asymmetric, 9 mm. long; petals included, white.

***Catopsis triticea*** L. B. Smith, Contr. Gray Herb. 127: 19. 1939.

Epiphytic in wet forests, 1360–1450 meters; Alta Verapaz. Chiapas.

Plant 2–3 dm. high; leaves 8–12 cm. long, narrowly white-margined, sheaths large, elliptic, blades narrowly triangular, acuminate, about 15 mm. wide; scape erect, slender, exceeding the leaves; scape-bracts imbricate, broadly ovate; staminate inflorescence 6.5 cm. long, sparsely branched at base; primary bracts much shorter than the spikes; spikes dense; floral bracts ovate, acute, straight, about equaling the sepals, nerved; flowers 10 mm. long; sepals 9 mm. long, asymmetric; petals exerted; pistillate inflorescence simple, dense, 6–8 cm. long; floral bracts 12 mm. long, exceeding the sepals; flowers 13 mm. long; sepals 10 mm. long, asymmetric; style 1 mm. long.

***Catopsis Wawraea*** Mez in DC. Monog. Phan. 9: 626. 1896.  
Figure 79.

Epiphytic in high forest; southern Mexico; British Honduras; Costa Rica; probably extending into Guatemala.

Plant up to 35 cm. high; leaves few, 2 dm. long, blades ligulate, apiculate, 4 cm. wide; scape suberect to decurved; scape-bracts remote; inflorescence few-branched or simple; primary bracts short; floral bracts narrow, thin, shorter than the sepals; flowers suberect, dioecious; sepals subsymmetric, thin, the staminate lanceolate, acute, 15 mm. long, the pistillate broadly elliptic, subobtusate, 18 mm. long.

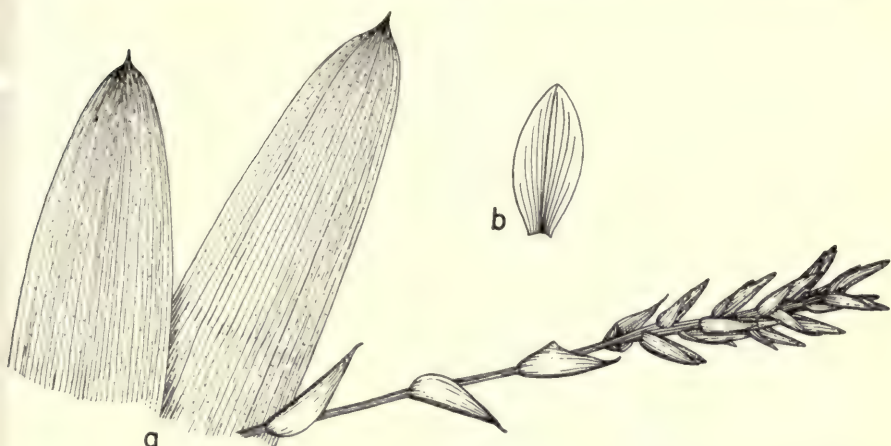


FIG. 79. *Catopsis Wawraea*. a, Inflorescence and upper part of scape with apex of leaves ( $\times \frac{1}{2}$ ). b, Pistillate sepal ( $\times 1$ ).

### GREIGIA Regel

Coarse terrestrial or saxicolous herbs, usually stemless or short-caulescent; leaves many in a dense rosette, blades linear; scape none; inflorescence central or lateral, compound or simple, dense; floral bracts evident; flowers perfect; sepals free or short-connate at base, petals connate by their margins; stamens usually included, filaments connate with the petals, pollen globose, smooth; ovary triangular, epigynous tube very short or none; ovules numerous; fruit fleshy.

Eighteen species from Mexico to Chile and Juan Fernandez.

**Greigia Steyermarkii** L. B. Smith, Contr. Gray Herb. 154: 35. 1945. Figure 80.

Cloud forest, 2100–2400 meters; endemic; Zacapa (type from mountain above Río Repollal, *Steyermark 42553*). Mexico.

Stem stout, 1.5–2.4 meters long; leaves 1 meter or longer, spreading or ascending, sheaths narrowly triangular-ovate, dark castaneous, covered with a whitish membrane outside, subglabrous inside, subdensely serrate toward apex with stout dark spines up to 4 mm. long, blades long-acuminate, slightly constricted and channeled toward base, to 3 cm. wide, glabrous above, whitish-lepidote beneath, armed with pale spines to 1.5 mm. long; inflorescence dense, few-flowered; outer bracts triangular-ovate, acuminate, pungent, dark castaneous, whitish-lepidote, coarsely serrate; floral bracts lanceolate, acuminate, entire, carinate, pungent, 26 mm. long, exceeded by the sepals, whitish-lepidote, castaneous toward apex; flowers 4 cm. long; sepals like the floral bracts, 22 mm. long; petals 30–32 mm. long, white; stamens and style included.





## GUZMANIA Ruíz &amp; Pavón

Stemless or rarely long-caulescent herbs, mostly epiphytic; leaves entire, the sheaths conspicuous; inflorescence simple or compound, the spikes always poly-stichous-flowered; flowers perfect; sepals usually somewhat connate; petals connate or closely agglutinated, naked, yellow or white; stamens usually included, the filaments more or less fused to the petals; ovary wholly superior; ovules many; seeds with a long basal straight usually brownish coma.

One hundred and ten species in tropical and subtropical America.

Inflorescence simple.

Inflorescence cyathiform, the outer bracts much enlarged, red.

Leaves not over 25 mm. wide; inner bracts nearly similar to the outer.

*G. minor*

Leaves much wider; inner bracts much reduced.....*G. lingulata*

Inflorescence densely fusiform.....*G. nicaraguensis*

Inflorescence compound, with lax elongate spikes.

*G. Scherzeriana* var. *guatemalensis*

**Guzmania lingulata** (L.) Mez in DC. Monog. Phan. 9: 899. 1896. *Tillandsia lingulata* L. Sp. Pl. 286. 1753.

Epiphytic in forests, 100–1080 meters; British Honduras; Nicaragua; Costa Rica; West Indies; northern South America; probably extending into Guatemala.

Plant about 3 dm. high; leaves 35–45 cm. long, sheaths ovate, large, blades ligulate, acute, 3–4 cm. wide, obscurely lepidote; scape erect, short and stout; scape-bracts dense, the lower foliaceous, the upper reddish and forming an involucre about the flowers; inflorescence corymbiform, up to 7 cm. across, 10–50-flowered; floral bracts linear, cucullate; flowers erect, 45 mm. long; sepals free, linear, obtuse; petals linear, cucullate, white; coma reddish brown.

**Guzmania minor** Mez in DC. Monog. Phan. 9: 901. 1896.

Epiphytic in forests, 40–750 meters; Alta Verapaz (8–10 miles northwest of Cubilgüitz, *Steyermark* 45033). Nicaragua; Costa Rica; Panama; Colombia; Ecuador; Brazil.

Leaves many, densely rosulate, suberect, 3 dm. long, exceeding the inflorescence, sheaths distinct, ovate, blades ligulate, acute or acuminate with a caudate apex, 25 mm. wide or less; scape very short; scape-bracts densely imbricate, the lower green, the upper red and forming a showy involucre about the inflorescence; inflorescence simple, few-flowered, corymbiform; floral bracts like the upper scape-bracts but slightly cucullate, smaller and thinner; flowers 35 mm. long; sepals

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FIG. 80. *Greigia Steyermarkii*. a, Habit with most of leaves removed to show inflorescence between leaves ( $\times \frac{1}{2}$ ). b, Flower with bract ( $\times \frac{2}{3}$ ).

linear-oblong, acute, free; petals linear, obtuse, white; stamens about equaling the petals, high-connate.

Until living material of *Guzmania minor* and *G. lingulata* can be compared, the only practical distinction is in the width of the leaves. In dried specimens the fragile bracts and flowers are so mashed that it is impossible to get a fair idea of their characters.

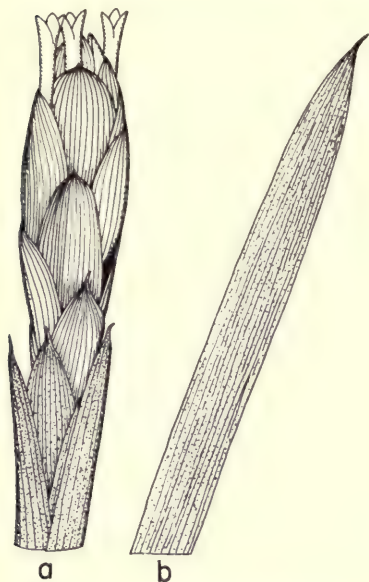


FIG. 81. *Guzmania nicaraguensis*.  
a, Inflorescence and upper part of  
scape ( $\times \frac{1}{2}$ ). b, Apex of leaf ( $\times \frac{1}{2}$ ).



FIG. 82. *Guzmania Scherzeriana*  
var. *guatemalensis*. Portion of inflo-  
rescence ( $\times \frac{1}{3}$ ).

***Guzmania nicaraguensis*** Mez & C. F. Baker, Bull. Torrey Bot. Club 30: 436. 1903. *G. bracteosa* sensu Donn.-Smith, Bot. Gaz. 47: 262. 1909. Not André, 1896. Figure 81.

Epiphytic in forests, 780–1800 meters; Alta Verapaz; Baja Verapaz; Izabal. Oaxaca; British Honduras; Nicaragua; Costa Rica; Panama.

Leaves 3–6 dm. long, usually exceeding the inflorescence, soon glabrous, often red-striped, sheaths large, ovate, blades ligulate, apiculate, 20–25 mm. wide; scape short, erect, its bracts imbricate, the upper ones elliptic, acute; inflorescence simple, dense, fusiform, 7–10 cm. long, glabrous; floral bracts elliptic, obtuse or broadly acute, 5 cm. long, thin; sepals 25 mm. long, 8 mm. wide, obtuse, short-connate; petals over 6 cm. long, obtuse, yellow.

**Guzmania Scherzeriana** Mez var. **guatemalensis** (L. B. Smith) L. B. Smith, Contr. U. S. Nat. Herb. 29: 296. 1949. *G. guatemalensis* L. B. Smith, Contr. Gray Herb. 117: 8. 1937. Figure 82.

Epiphytic in dense forest, 200–1000 meters; Alta Verapaz (type from Chama, 330 meters, *H. Johnson 391*); Huehuetenango (between Ixcán and Río Ixcán). Costa Rica; Colombia.

Plant 6 dm. high; leaves over 6 dm. long, sheaths large, ovate, blades ligulate, acute, apiculate, 45 mm. wide; scape erect, stout, its bracts foliaceous, densely imbricate; inflorescence laxly compound, subpyramidal, 25 cm. long, glabrous; primary bracts broadly ovate, acute, mostly much shorter than the branches; branches divergent to spreading, 1–2 dm. long (5–7 cm. or rarely up to 10 cm. long and dense or subdense in the typical variety), 10–12-flowered; rhachis nearly straight; floral bracts broadly elliptic, obtuse, 1–2 cm. long, much exceeded by the sepals, inflated, not at all carinate, subcoriaceous, even; flowers spreading (suberect in the typical variety); pedicels stout, 4 mm. long; sepals elliptic, obtuse, 20–25 mm. long, ecarinate, connate for 10 mm.; petals 33 mm. long.

### HECHTIA Klotzsch

Mostly coarse herbs with the habit of *Yucca* or *Agave*; stem short or mostly none; leaves densely rosulate, usually recurved, acuminate, pungent; scape erect or ascending; lower scape-bracts foliaceous; inflorescence paniculate; branches from capitate to lax and elongate; flowers small, functionally dioecious; sepals squamiform, free; petals naked, usually free; stamens included to exserted; ovary from wholly superior to mostly inferior; seeds numerous, narrowly winged to almost naked.

Over 30 species in arid regions of Texas, Mexico and northern Central America. According to Standley, plants of this genus are abundant in many parts of Guatemala. Their favorite habitat is at the base of cliffs, where they form wide, impenetrable thickets.

Floral bracts and sepals drying uniformly roseate with no hyaline margin.

*H. dichroantha*

Floral bracts and sepals brown, stramineous or hyaline.

Flowers distinctly pedicellate, the staminate spreading, the pistillate reflexed; floral bracts about equaling the pedicels. . . . . *H. guatemalensis*

Flowers subsessile; floral bracts shorter than the sepals. . . . . *H. glomerata*

**Hechtia dichroantha** Donn. Smith, Bot. Gaz. 42: 299. 1906.

Desert hillsides, 1600 meters; endemic; Baja Verapaz (type from near Santa Rosa, *O. F. Cook*); Chiquimula (a very old and weathered pistillate specimen doubtfully referred here). Honduras.

About 1 meter high; leaves 2–4 dm. long, blades narrowly triangular, 4 cm. wide, glabrous above, evenly appressed-white-lepidote beneath, laxly serrulate; scape elongate, glabrous, its bracts 7–9 cm. long, linear from a broadly ovate base,



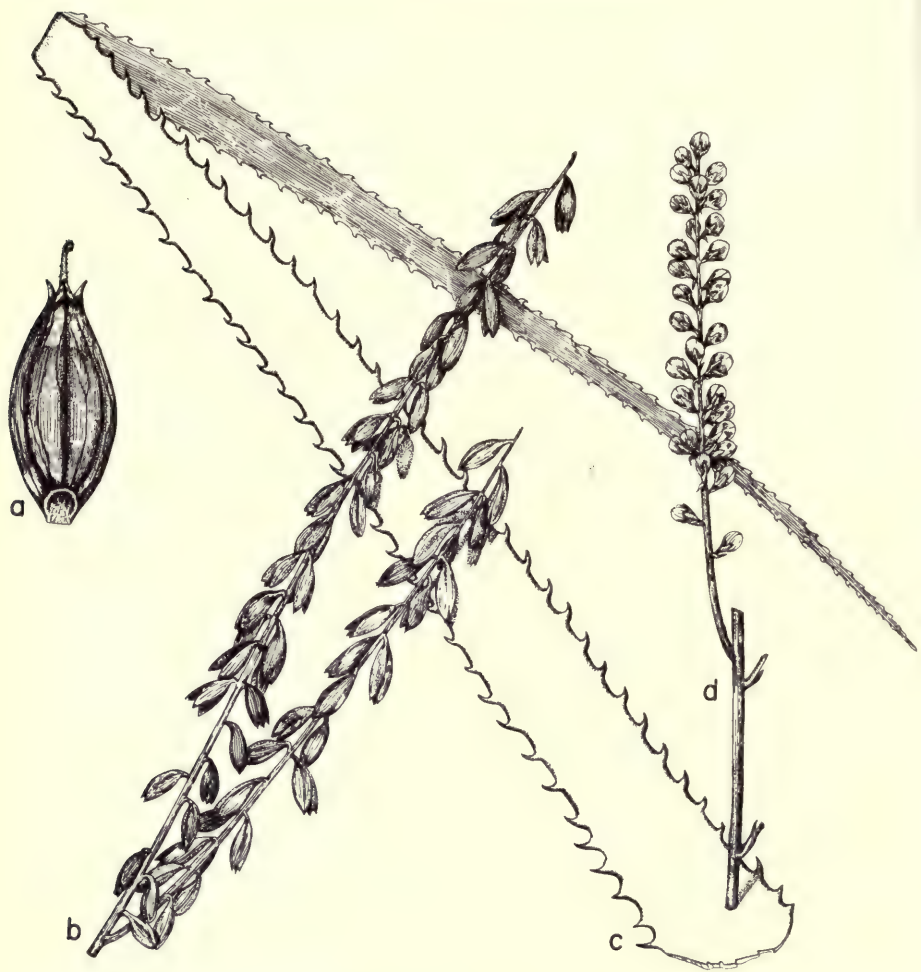


FIG. 83. *Hechtia guatemalensis*. a, Capsule ( $\times 5$ ). b, Fruiting branch ( $\times \frac{1}{2}$ ). c, Leaf ( $\times \frac{1}{2}$ ). d, Branch of staminate inflorescence ( $\times \frac{1}{2}$ ).

red, serrulate; inflorescence laxly bipinnate, 3–6 dm. long, glabrous except for the short primary bracts; racemes strobilate, 3–8 cm. long, sessile or the lower ones stipitate; floral bracts linear-lanceolate, equaling or exceeding the sepals, membranaceous; staminate flowers appearing pedicellate because of the slender almost wholly inferior remnant of the ovary; sepals lance-ovate, acute, red; petals 6 mm. long, white; stamens shorter than the petals.

The Chiquimula plant has racemes up to 15 cm. long and sessile, broadly ellipsoid, almost wholly inferior capsules 10 mm. long.

**Hechtia glomerata** Zucc. Abh. Akad. Münch. 3: 240. 1840.  
*H. Ghiesbreghtii* Lem. Ill. Hortic. 10: pl. 378. 1863. *H. Morreniana*  
 Mez in DC. Monog. Phan. 9: 547. 1896.

Rocky slopes, 800–1350 meters; Quiché; Huehuetenango. Texas; Mexico.

Up to 18 dm. high; leaves about 40 in a dense spreading rosette, 25 cm. long, blades narrowly triangular, 3 cm. wide, glabrous above, covered beneath with a close layer of pale scales, laxly serrate with spines up to 5 mm. long; scape erect or ascending; inflorescence laxly compound, 2–4 dm. long; primary bracts triangular-ovate, much shorter than the branches; branches densely capitate to short-cylindric or the secondary staminate ones sometimes up to 7 cm. long; floral bracts broadly ovate, acute, 4 mm. long, yellow-brown, erose, thin; flowers subsessile; sepals elliptic-oblong, obtuse or apiculate, 4 mm. long; petals free, white, 5 mm. long; stamens included; ovary superior, densely tomentose-lepidote, stigmas sessile.

**Hechtia guatemalensis** Mez, Rep. Nov. Spec. 3: 14. 1906.  
*Piña de coche* (El Progreso); *Piñuelón* (fide Aguilar). Figure 83.

Rocky slopes and dry thickets, 200–660 meters; El Progreso; Zapaca; Chiquimula; Guatemala (type from San Bernardo, between Trapiche Grande and Las Canoras, *H. Pittier 137*). El Salvador; Honduras; Nicaragua.

Slender, probably 2 meters high; leaves 7–8 dm. long, blades linear-triangular, 3–6 cm. wide, soon glabrous above, evenly white-lepidote beneath, the caudate apex entire, elsewhere laxly armed with teeth 3–4 mm. long; scape glabrous, its bracts unknown; inflorescence amply and densely tripinnate, 1 meter long, glabrous; primary bracts lance-triangular, not over 3 cm. long; branches to 3 dm. long; racemes 10–15 cm. long, lax; floral bracts acuminate, about equaling the pedicels, scarious; staminate pedicels slender, 2 mm. long; sepals elliptic, obtuse, 1.75 mm. long; petals 5 mm. long, white, exceeding the stamens; pistillate pedicels stout, 1 mm. long; ovary almost wholly inferior; capsule ellipsoid, 5–8 mm. long, glabrous, irregularly veiny.

## HOHENBERGIA Schultes

Stemless, usually epiphytic herbs; leaf-blades ligulate, spinose-serrate; scape well developed; inflorescence bipinnate or tripinnate, composed of dense strobiliform spikes; floral bracts evident; flowers perfect, sessile, compressed; sepals nearly or quite free, asymmetric, mucronate; petals nearly or quite free, appendaged; stamens included, the second series connate with the petals, pollen with 2 or 4 pores; ovary wholly inferior, compressed and subulate, epigynous tube very short or none, ovules obtuse or caudate.

Over 30 species, about evenly divided between the West Indies and eastern Brazil, the following the only species from continental North America.

**Hohenbergia guatemalensis** L. B. Smith, Lilloa 6: 382. 1941.  
Figure 84.

Epiphytic or, in the cloud forests of high altitudes, terrestrial, 1400 to nearly 2600 meters; Alta Verapaz (type from mountains east of Tactic, on road to Tamahú, *Standley 71169*); Zacapa. Vera Cruz.

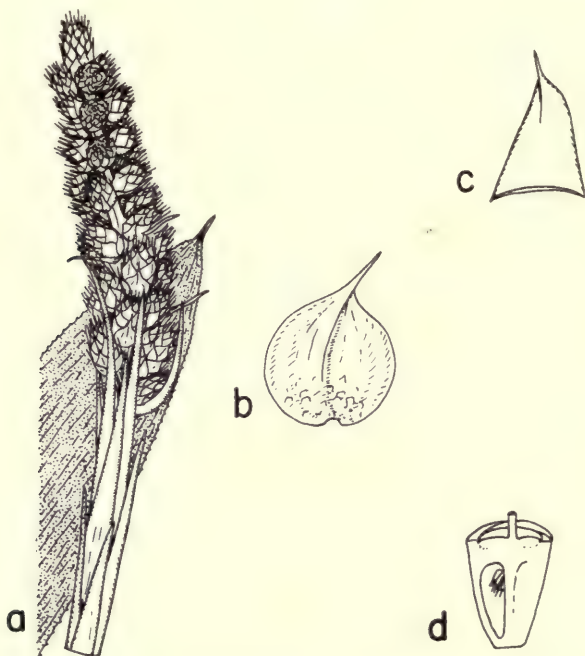


FIG. 84. *Hohenbergia guatemalensis*. a, Inflorescence, upper part of scape, and apex of leaf ( $\times \frac{1}{3}$ ). b, Floral bract ( $\times 1\frac{1}{3}$ ). c, Sepal ( $\times 2\frac{2}{3}$ ). d, Longitudinal section through ovary, showing apical placentae and ovules ( $\times 2\frac{2}{3}$ ).

Plant 5–6 dm. high; leaf-blades 8 cm. broad, flat, broadly acute with an involute apical spine 1 cm. long, minutely pale-appressed-lepidote on both sides, subdensely serrate with teeth 1.5 mm. long; scape erect, stout, densely flocculose, its bracts densely imbricate, amply elliptic, acuminate and pungent, obscurely punctulate-lepidote; inflorescence bipinnate, densely cylindric, 2 dm. long; rhachis stout, alate-angled, brownish-flocculose; primary bracts like the scape-bracts but much smaller, the lower ones much exceeding the spikes; spikes stout, ellipsoid, 3 cm. long, many-flowered; floral bracts long-acuminate from a suborbicular base, 18 mm. long, 12 mm. wide, rather thin, brown, soon glabrous; sepals ovate, strongly mucronate, 8 mm. long; ovary obconic, much enlarged in fruit, epigynous tube none, placentae apical, ovules long-caudate.



The long-caudate ovules link this species with the Brazilian ones, since the West Indian species have obtuse ovules so far as known.

### LINDMANIA Mez

Low slender terrestrial herbs; the leaves entire or serrulate; scape erect, slender; inflorescence laxly paniculate; floral bracts minute; flowers small, white or green; sepals free; petals much exceeding the sepals, free, naked; stamens free; ovary wholly superior, glabrous; style slender; seeds slenderly fusiform with a narrow caudate appendage at each end.

Of the thirty species of this genus, one is from Paraguay and the remainder are from the Andes or the Guiana Highlands with only the following extending into Central America and southern Mexico.

**Lindmania micrantha** (Lindl.) L. B. Smith, Contr. Gray Herb. 104: 77. 1934. *Pitcairnia micrantha* Lindl. Bot. Reg. 29 Misc.: 44. 1843. *Cottendorfia neogranatensis* Baker, Handb. Bromel. 129. 1889. *Lindmania neogranatensis* Mez in DC. Monog. Phan. 9: 538. 1896. *L. flaccida* Standl. Jour. Wash. Acad. Sci. 13: 364. 1923. Figure 85.

Shady banks or cliffs and forests, 330–1200 meters; Escuintla; Sacatepéquez; Suchitepéquez; Retalhuleu. Oaxaca; El Salvador; “Colombia”; “Brazil.”

Plant 3–7 dm. high; leaves entire, constricted above the sheath, blades lanceolate, 3 dm. long, 4 cm. wide, thin, glabrous above, densely lepidote beneath; scape-bracts lanceolate or lance-ovate, thin; inflorescence up to 26 cm. long, arachnoid; branches ascending, many times longer than the primary bracts; floral bracts ovate, acuminate, barely exceeding the pedicels; flowers secund and nutant; sepals triangular-ovate, obtuse, 3–4 mm. long; petals narrowly elliptic, obtuse, 7–9 mm. long; stamens shorter than the petals.

### PITCAIRNIA L'Hérit.

Plants mostly terrestrial, rarely epiphytic, usually stemless; leaves fasciculate or imbricate along the stem, entire or spinose-serrate, the sheaths often bulbous-thickened, the blades linear to broadly oblanceolate with a definite petiole or narrowly triangular, sometimes dimorphic with some blades much reduced; scape usually present; inflorescence simple or compound; flowers perfect, pedicellate to subsessile; sepals free, acuminate to obtuse; petals free, slightly zygomorphic in most species, naked or appendaged near the base; stamens from shorter to longer than the petals, the anthers linear; style filiform, ovary usually in larger part superior, ovules caudate-appendaged at both ends or rarely with an annular wing.

About 230 species in tropical and subtropical America.

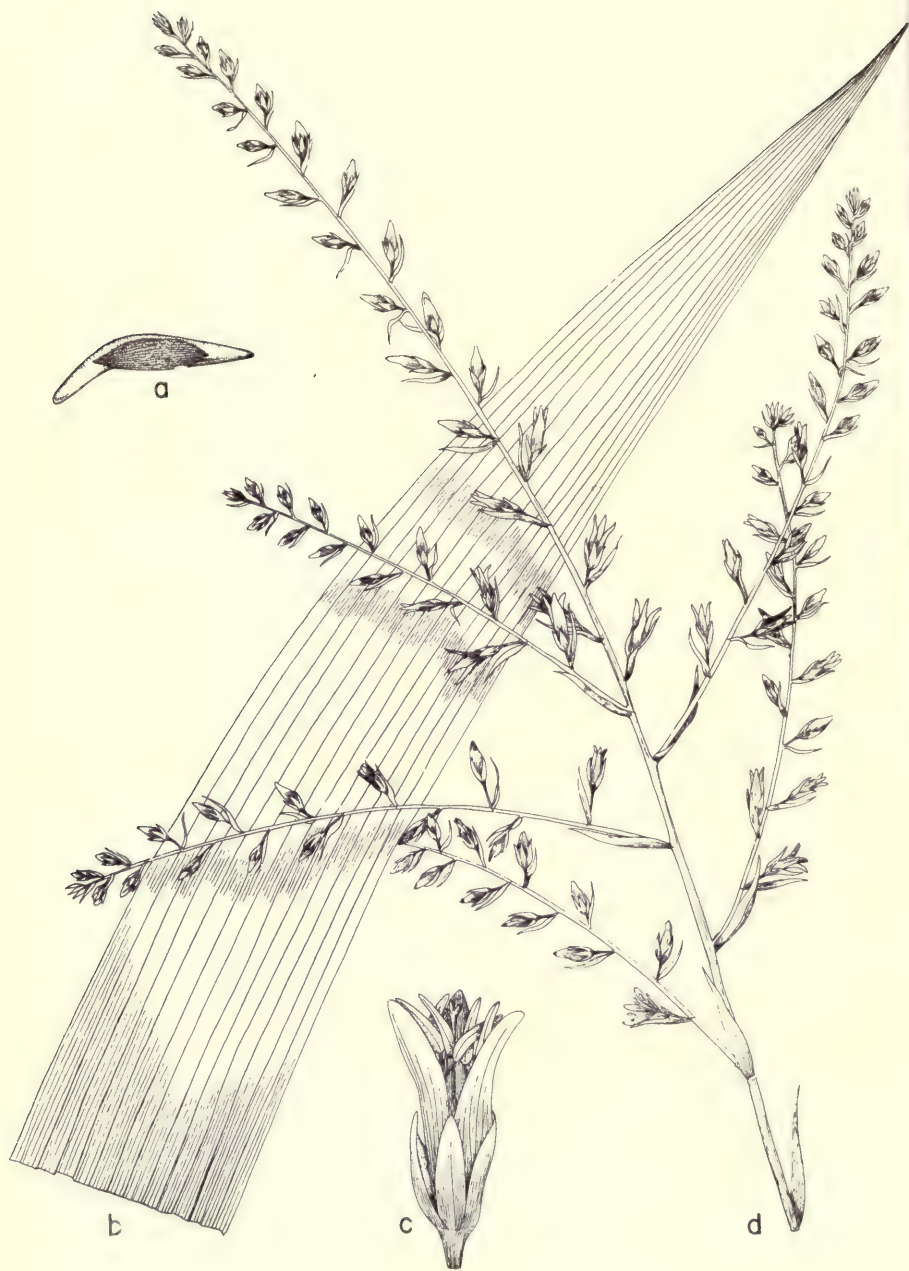


FIG. 85. *Lindmania micrantha*. a, Seed ( $\times 5$ ). b, Apex of leaf ( $\times 1$ ). c, Flower ( $\times 4$ ). d, Inflorescence and upper part of scape ( $\times 1$ ).

Leaf-blades all deciduous or if dimorphic with the larger (normal) type deciduous, not over 22 mm. wide.

Scape almost lacking; petals appendaged . . . . . *P. heterophylla*

Scape elongate, evident.

Floral bracts elongate, lanceolate, acuminate, the lowest exceeding the flowers (including the petals) . . . . . *P. puberula*

Floral bracts scarcely, if at all, exceeding the sepals.

Floral bracts 5-6 cm. long, broadly ovate, acute, glabrous; leaf-blades all alike . . . . . *P. saxicola*

Floral bracts scarcely over 3 cm. long at most.

Pedicels conspicuous; floral bracts all much shorter than the sepals. . . . . *P. Tuerckheimii*

Pedicels very short; lower floral bracts equaling or somewhat exceeding the sepals . . . . . *P. Calderonii*

Leaf-blades all persistent.

Sepals exceeding the floral bracts.

Floral bracts all shorter than the pedicels; leaf-blades dimorphic with the reduced type green, flexuous and flagelliform . . . . . *P. flagellaris*

Floral bracts exceeding at least the lower pedicels.

Floral bracts lanceolate; leaf-blades 1 cm. wide . . . . . *P. punicea*

Floral bracts broadly ovate; leaf-blades 4 cm. wide . . . . . *P. recurvata*

Sepals equaling or shorter than the floral bracts.

Inflorescence lax at base; petals 11 cm. long . . . . . *P. macrochlamys*

Inflorescence dense throughout.

Sepals acuminate.

Inflorescence few-flowered, subcorymbose; sepals 25 mm. long, glabrous. . . . . *P. longebracteata*

Inflorescence many-flowered, elongate; sepals 40 mm. long, floccose. . . . . *P. Carioana*

Sepals abruptly acute or obtuse and apiculate, oblong or elliptic.

Leaves entire.

Floral bracts with distinct blades which are often divergent and of a different color . . . . . *P. Wendlandi*

Floral bracts without a distinct blade, strict or slightly divergent. . . . . *P. ochroleuca*

Leaves spinose-serrate along the petioles.

Flowers 8-ranked; sepals 30-33 mm. long . . . . . *P. Hemsleyana*

Flowers only about 4-ranked; sepals 20-26 mm. long . . . . . *P. imbricata*

**Pitcairnia Calderonii** Standley & Smith in L. B. Smith, Contr. Gray Herb. 98: 8. 1932.

Wooded rocky slopes or exposed cliffs, 1500 meters; Zacapa; Chiquimula; Jutiapa. El Salvador.

Stemless, 5-6 dm. high; rhizome covered with old suborbicular dark castaneous leaf-sheaths and forming a pseudobulb; leaf-blades dimorphic, some persistent, nearly setiform, brown, uncinat-serrate, others deciduous in the dry season, linear-lanceolate, 3-6 dm. long, 8-16 mm. wide, entire, glabrous above,



white-floccose beneath when young; scape stout, erect; scape-bracts foliaceous, much exceeding the internodes; inflorescence dense at least toward apex, white-floccose, 15–20 cm. long; floral bracts lanceolate, acuminate, the lower ones nearly equaling to exceeding the sepals; flowers erect, to 6 cm. long; pedicels usually very short; sepals linear-lanceolate, acuminate, 25–30 mm. long, strongly alate-carinate (especially in the Guatemalan material); petals linear, obtuse, naked, red, about equaling the stamens; ovary two-thirds superior.

**Pitcairnia Carioana** Wittm. Bot. Jahrb. 14: Beibl. 32: 4. 1891 (type from Santa Maria Ikibál, department unknown, *Bernoulli & Cario 682*). Chiapas.

Leaves distinctly petiolate, entire, sheaths broadly triangular, covered toward apex with a buff membrane of scales, petioles 2 dm. long, channeled, blades lanceolate, acuminate, 6 dm. long, 35 mm. wide, glabrous; scape erect, shorter than the leaves, densely white-tomentulose, its bracts imbricate, lance-elliptic, acuminate, elongate, glabrous above the base; inflorescence densely subspicate, 3 cm. thick; floral bracts narrowly elliptic-ovate, acuminate, 75 mm. long, thin, glabrous outside; flowers to 12 cm. long; pedicels very stout, 8 mm. long; sepals lanceolate, acuminate, about 4 cm. long, floccose; petals naked, obtuse, strongly decurved after anthesis; ovary half superior; ovules long-caudate.

**Pitcairnia flagellaris** L. B. Smith, Contr. U. S. Nat. Herb. 29: 280, fig. 5. 1949. Figure 86.

On vertical limestone bluff, 300–500 meters; endemic; Alta Verapaz (type and only collection from Montaña Yxocubvain,  $2\frac{1}{2}$  miles west of Cubilgüitz, *Steyermark 44976*).

Caulescent, stoloniferous, over 5 dm. high; stem prostrate, at least 9 cm. long, covered with the remains of old leaf-bases; leaves many, subrosulate, to 7.5 dm. long, subspreading, soon glabrous, sheaths small, suborbicular, dark castaneous, serrulate toward apex, blades relatively persistent, serrate at base, dimorphic, some very narrowly flagelliform, others slightly narrowed above the base but scarcely petiolate, linear, acuminate, 11 mm. wide; scape erect, slender, glabrous; scape-bracts narrowly triangular, much shorter than the internodes; inflorescence a lax depauperate panicle, 33 cm. long; primary bract scarcely larger than the lower floral bracts; the single lateral branch 13 cm. long including the elongate sterile base; floral bracts lanceolate, about half as long as the pedicels; flowers subspreading; pedicels very slender, to 19 mm. long, white-flocculose at base; sepals lance-oblong, acute, 14 mm. long, ecarinate, glabrous; petals red, obtuse, bearing a truncate lacerate scale at base; stamens included; ovary two-thirds superior; ovules short-caudate.

**Pitcairnia Hemsleyana** Mez in DC. Monogr. Phan. 9: 455. 1896.

Moist cliffs, 1150 meters; endemic; Chiquimula; Sacatepéquez-Chimaltenango boundary (type from Volcán de Fuego, *Salvin*); San Marcos.

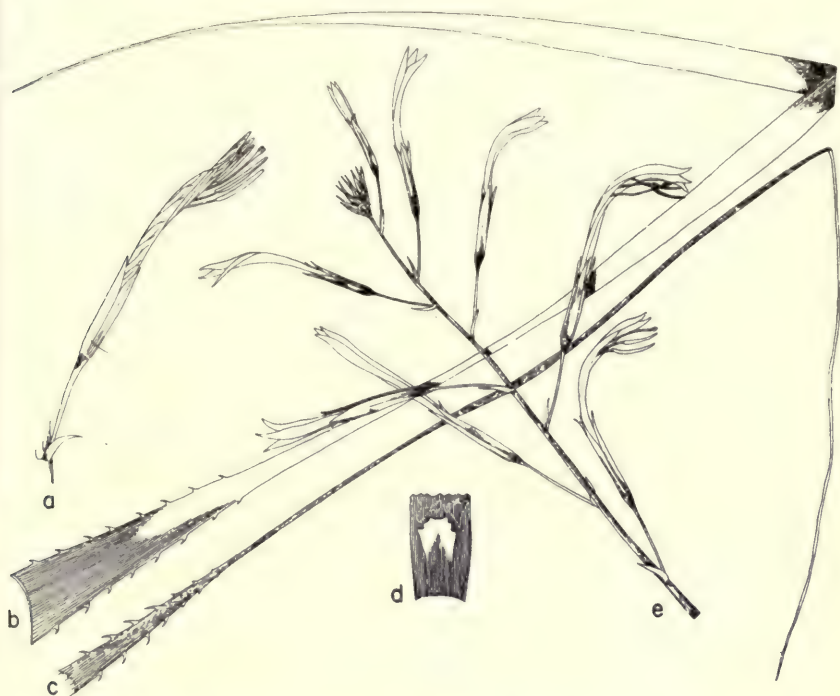


FIG. 86. *Pitcairnia flagellaris*. *a*, Flower with pedicel and floral bract ( $\times \frac{4}{5}$ ). *b*, *c*, Dimorphous leaves (*b*,  $\times \frac{2}{5}$ ; *c*,  $\times \frac{4}{5}$ ). *d*, Base of petal showing truncate scale ( $\times 2 \frac{2}{5}$ ). *e*, Inflorescence ( $\times \frac{4}{5}$ ).

Stemless, over 1 meter high; leaves dimorphic, the outer ones bladeless, acute, the inner subpetiolate, 8 dm. long, sheaths broadly ovate, dark, petioles broad, laxly spinulose, blades linear-lanceolate, acuminate, 5–6 cm. wide, entire, glabrous above, finely pale-lepidote beneath; scape erect, stout, its bracts imbricate, broadly ovate, acute; inflorescence simple, densely cylindric, 35 cm. long, 35 mm. thick; floral bracts strict with divergent tips, 8-ranked, broadly ovate, acute, 55 mm. long, becoming glabrous; pedicels slender, 7 mm. long; sepals oblong, obtuse and apiculate, 30–33 mm. long; petals linear, 8 cm. long, about equaling the stamens, naked, pale.

Further material may show that this species is not distinct from *P. imbricata*.

***Pitcairnia heterophylla*** (Lindl.) Beer, Bromel. 68. 1857. *Puya heterophylla* Lindl. Bot. Reg. 26: pl. 71. 1840. *Spinillon* (Chiquimula); *Gallo del diablo* (fide Aguilar). Figure 87.

Pendent from wet or dry cliffs, often in forest, sometimes epiphytic in soil (fide Standley), 80–2000 meters; Baja Verapaz; Zacapa;

Chiquimula; Jalapa; Santa Rosa; Guatemala; Huehuetenango; Quezaltenango. Southern Mexico to Panama; Venezuela to Ecuador.

Leaves very many in a large bulb, sheaths suborbicular to ovate, deep castaneous, blades dimorphic, the outer ones reduced to spinose-serrate rigid castaneous spines, the others green, linear, filiform-acuminate, up to 7 dm. long and 13 mm. wide, soon glabrous, deciduous, entire above the break and spinulose-serrate below it; scape usually very short and concealed by the leaves, its bracts ovate, acuminate or spine-tipped, thin; inflorescence simple, erect, capitate or subspicate; floral bracts like the upper scape-bracts, entire, shorter than the sepals; flowers erect; pedicels 3 mm. long, obconic; sepals narrowly triangular, 3 cm. long; petals linear, to 55 mm. long, red, bearing a scale above the base; ovary about half superior; ovules long-caudate; capsule slenderly ovoid, much shorter than the sepals.

The recurved spines often tear the hands painfully. Known in Costa Rica as "broma," doubtless in sarcasm, since the plant is no "joke" (fide Standley).

**Pitcairnia heterophylla** forma **albiflora** Standley & L. B. Smith, Lilloa 6: 383. 1941.

On tree, 1200 meters; Sacatepéquez (type from near Las Lajas, Standley 58302). Mexico.

Petals white.

**Pitcairnia imbricata** (Brongn.) Regel, Gartenflora 17: 135. 1868. *Neumannia imbricata* Brongn. Ann. Sci. Nat. II. 15: 369. 1841. *N. petiolata* Koch & Bouché ex Koch, Ind. Sem. Hort. Berol. 1856: App. 2. 1857 (based on cultivated material sent from Guatemala to Germany by Warszewicz). *Pitcairnia petiolata* Baker, Jour. Bot. 19: 307. 1881. Figure 88.

Terrestrial or epiphytic, 150–1360 meters; Alta Verapaz; Izabal; Suchitepéquez; Quezaltenango. Southern Mexico; British Honduras.

Up to 1 meter high; leaves with spinose-serrate petioles, blades 5–9 dm. long, 30–55 mm. wide, acuminate, entire, soon glabrous; scape erect; scape-bracts imbricate, the lower ones subfoliaceous, the upper ovate; inflorescence subspicate, up to 4 dm. long, 25–40 mm. thick; floral bracts broadly ovate, acute, 5–6 cm. long, green, dull red or brownish purple; flowers 45–70 mm. long, glabrous; pedicels stout; sepals 20–26 mm. long, linear-oblong, apiculate; petals greenish white or yellow, naked or appendaged; ovary almost wholly superior.

The distinction between naked and appendaged petals has proved unreliable elsewhere in *Pitcairnia* and no other character has been found to correlate with it in separating *P. petiolata* from *P. imbricata*.



FIG. 87. *Pitcairnia heterophylla*.  
*a*, Habit ( $\times \frac{1}{3}$ ). *b*, Base of petal with  
scale ( $\times 1$ ).

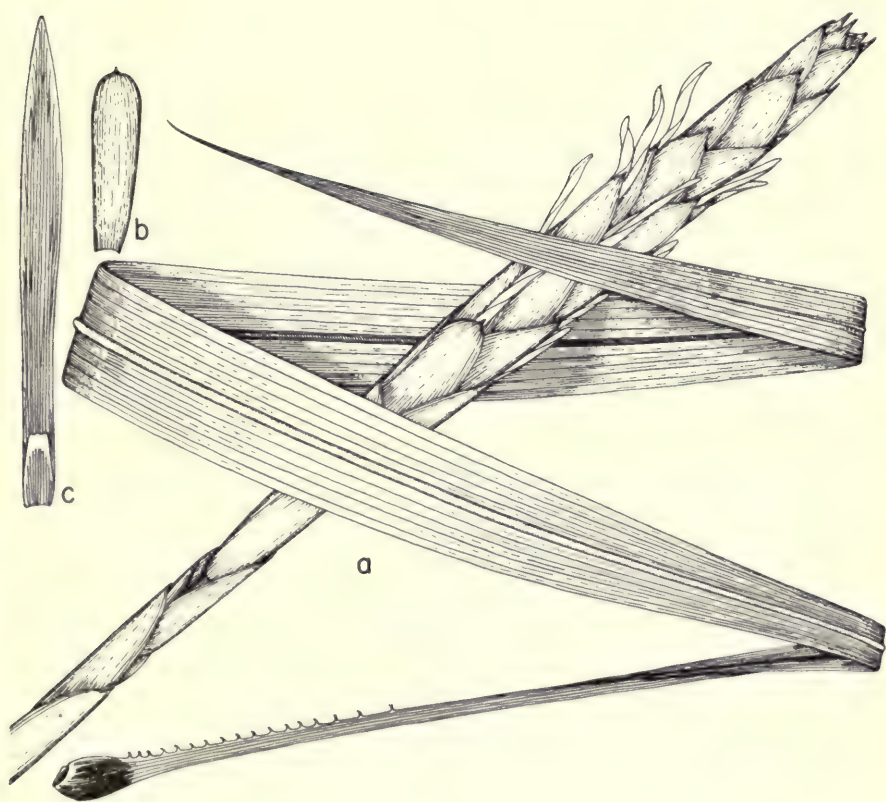


FIG. 88. *Pitcairnia imbricata*. *a*, Inflorescence and upper part of scape with  
leaf ( $\times \frac{1}{2}$ ). *b*, Sepal ( $\times 1$ ). *c*, Petal ( $\times 1$ ).

***Pitcairnia longebracteata*** Bouché ex Mez in DC. Monogr. Phan. 9: 428. 1896 (type and only collection from cultivated material sent from Guatemala to Germany by Warszewicz).

Plant imperfectly known; leaves probably all alike and persistent, over 7 dm. long, exceeding the inflorescence, blades narrowed for a long distance above the base but not distinctly petiolate, 35 mm. wide, entire, glabrous above, covered below with a dense layer of buff scales; scape distinct; scape-bracts foliaceous, exceeding the inflorescence; inflorescence subcorymbose, few-flowered; floral bracts 6–8 cm. long; pedicels slender, 1 cm. long; sepals acuminate, 25 mm. long, ecarinate, glabrous; ovary two-thirds superior.

Although there is some uncertainty about the character of the leaves in this species, the width (35 mm.) of the blades much exceeds that of any of the species that are known to be deciduous.

***Pitcairnia macrochlamys*** Mez, Fedde Rep. Nov. Spec. 3: 6. 1906. Figure 89.

Terrestrial, 400 meters; endemic; Alta Verapaz (type from Secanquim, *Pittier 222*); Izabal.

Leaves distinctly petiolate, sheaths short, triangular-ovate, deep castaneous, thickly covered with brown scales, petioles 3 dm. long, entire, channeled, blades narrowly lanceolate, acuminate, 14 dm. long, 4 cm. wide, densely spinulose-serrate toward apex, thin, glabrous and bright green above, covered beneath with a membrane of white coalesced scales; scape conspicuous, stout, soon glabrous; scape-bracts appressed, ovate, acuminate, becoming glabrous, the upper ones just equaling the internodes; inflorescence 3 dm. long, 35 mm. thick; floral bracts erect, broadly ovate, triangular-acute, 35–50 mm. long, equaling or exceeding the sepals, chartaceous, at length glabrous; sepals acute, 34 mm. long; petals exceeding the stamens, bearing a small scale at base, green, becoming reddish toward apex; ovary half superior.

***Pitcairnia ochroleuca*** (Koch & Bouché) Baker, Jour. Bot. 19: 306. 1881. *Neumannia ochroleuca* Koch & Bouché ex Koch, Ind. Sem. Hort. Berol. 1856: App. 2. 1857 (based on material of unknown origin cultivated in Germany).

In dense wet forest or in dense colonies on cliffs, 330–1200 meters; apparently endemic; Santa Rosa; Sololá; Retalhuleu; Quezaltenango.

Leaves exceeding the inflorescence, broadly but distinctly petiolate, blades lanceolate, acuminate, 8 dm. long, 45 mm. wide; scape stout, white-lanate; scape-bracts densely imbricate, elliptic, acuminate; inflorescence scapiform, 25 cm. long, 25 mm. thick, many-flowered; floral bracts ovate, 5 cm. long, 16 mm. wide, much exceeding the sepals; flowers 65 mm. long; sepals oblong, rounded, apiculate, 25–30 mm. long, glabrous; petals linear, obtuse, about 6 cm. long, pale ochraceous, naked or appendaged; ovary more than three-fourths superior.

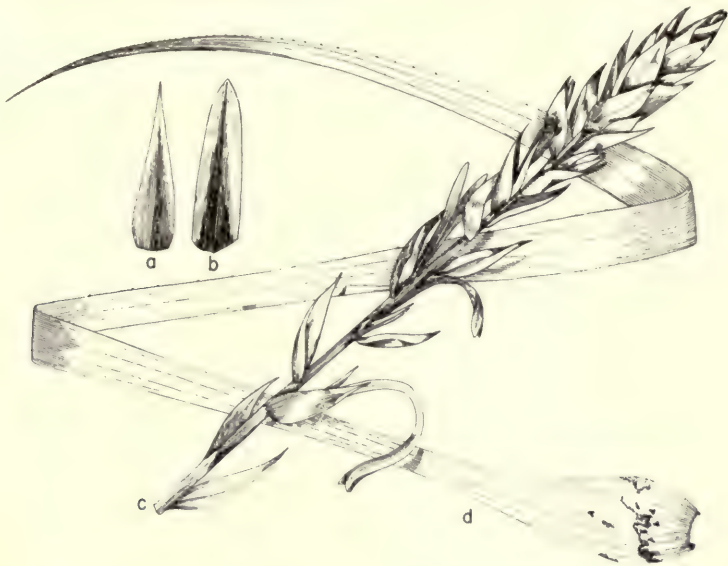


FIG. 89. *Pitcairnia macrochlamys*. a, Floral bract ( $\times \frac{2}{3}$ ). b, Sepal ( $\times \frac{2}{3}$ ). c, Inflorescence and upper part of scape ( $\times \frac{1}{3}$ ). d, Leaf ( $\times \frac{1}{6}$ ).

This species was collected by Sessé over one hundred and thirty years ago but no record of his locality has been preserved. Specimens with naked and with appendaged petals agree in all other characters. It is even doubtful if the presence or absence of spines on the petiole is a valid distinction, but the scape appears consistently stouter in the plants with entire leaves.

***Pitcairnia puberula* Mez & Donn. Smith, Bot. Gaz. 19: 264. 1894.**

Dense colonies on rocks of brushy slope, 1200–1400 meters; endemic; Jalapa; Santa Rosa (type from Cenaguilla, Heyde & Lux 3879).

Plant stemless, 6 dm. high; leaf-sheaths broadly ovate, dark brown, forming a large pseudobulb, leaf-blades dimorphic, some persistent, setiform, spinose-serrate, others green, deciduous along a straight transverse line, linear, acuminate, 5 dm. long, 8–18 mm. wide, entire above the break, glabrous above, white-tomentose-lepidote beneath at first; scape-bracts erect, foliaceous, densely imbricate; inflorescence cylindric, to 27 cm. long, many-flowered; lower floral bracts like the scape-bracts, much exceeding the flowers; pedicels stout, 4 mm. long; sepals narrowly triangular, acute, 21 mm. long, ecarinate, becoming glabrous; petals 4 cm. long, naked; capsule almost wholly superior.



***Pitcairnia punicea*** Scheidw. Bull. Acad. Brux. 9, pt. 1: 25. 1842.  
*P. Jacksoni* Hook. Bot. Mag. 76: pl. 4540. 1850 (type from cultivated material from Guatemala without further locality). Figure 90.



FIG. 90. *Pitcairnia punicea*. a, Habit ( $\times \frac{1}{2}$ ). b, Flower with pedicel and bract ( $\times 1\frac{1}{2}$ ). c, Sepal ( $\times 1\frac{1}{2}$ ). d, Petal with scale at base ( $\times 1\frac{1}{2}$ ).

Terrestrial on rocky stream-banks in jungle or on limestone bluffs, from near sea level to 1200 meters; Alta Verapaz; Izabal; Huehuetenango. Southern Mexico.

Plant slender, caulescent, 4 dm. high, stem 15 cm. long, covered with old leaf-bases, branched at base; leaves all alike, suberect, persistent, 25-30 cm. long, sheaths narrowly ovate, often dark castaneous toward base, blades linear, filiform-acuminate, 1 cm. wide, constricted below but not really petiolate, laxly serrulate, glabrous above, covered beneath with a thin pale membrane of coalesced scales; scape erect, much shorter than the leaves, its bracts imbricate, foliaceous; inflo-

rescence laxly racemose, to 2 dm. long, furfuraceous-lepidote; floral bracts lanceolate, the lower ones exceeding the pedicels; flowers suberect to spreading; pedicels slender, 15–30 mm. long; sepals oblong, asymmetric, acute, 15 mm. long, ecarinate, red; petals obtuse, 5 cm. long, red, bearing a large bilobed scale at base; ovary three-fourths or more superior, ovules obtuse; seeds with a thick annular wing.

**Pitcairnia recurvata** (Scheidw.) K. Koch, Ind. Sem. Hort. Berol. 1857: App. 4. 1858. *Puya recurvata* Scheidw. Allg. Gartenz. 10: 275. 1842. *Pitcairnia taenipetala* Mez in DC. Monogr. Phan. 9: 382. 1896. *Azucena silvestre* (Petén, fide Lundell).

Terrestrial on cliffs and limestone outcrops; 25–800 meters; Petén; Izabal; Huehuetenango. Southern Mexico; British Honduras; Colombia.

Plant up to 15 dm. tall; rhizome elongate; leaves entire, some reduced to short broad dark brown sheaths, others with a long channeled petiole and a linear-lanceolate acuminate blade up to 1 meter long and 4 cm. wide, glabrous above, white-furfuraceous beneath; scape stout, white-furfuraceous; inflorescence racemose, lax except near apex, to 45 cm. long; floral bracts broadly ovate, acute, erect, shorter than the sepals, rose or green, soon glabrous; pedicels 2 cm. long; sepals oblong, 20–25 mm. long; petals yellowish white, bearing a large scale at base; ovary half superior.

**Pitcairnia saxicola** L. B. Smith, Contr. Gray Herb. 117: 29. 1937. *P. fulgens* A. Dietr. Allg. Gartenz. 19: 137. 1851 (type from cultivated material sent from Guatemala to Germany by Warszewicz), not Dietr. or Dcne.

On rocks, Guatemala, without further locality (Warszewicz). Mexico.

Plant 4–5 dm. high; rhizome bulbiform-thickened; leaves all alike, 3–5 dm. long, sheaths triangular-ovate, blades deciduous, linear, acuminate, slightly narrowed at base, 15 mm. wide, glabrous at maturity, the persistent base spinulose; scape stout, densely white-lanate; scape-bracts strict, densely imbricate, broadly ovate, acute, subglabrous; inflorescence 2 dm. long; rhachis farinose; floral bracts densely imbricate, broadly ovate, 5–6 cm. long, barely exceeded by the sepals; pedicels 2 mm. long; sepals acuminate, 5 mm. wide, carinate; petals 7 cm. long, about equaling the stamens, bright red; ovary almost wholly superior; ovules long-caudate.

**Pitcairnia Tuerckheimii** Donn. Smith, Bot. Gaz. 13: 190. 1888 (type and only collection from Santa Rosa, Dept. Baja Verapaz, 1500 meters, *Tuerckheim 1298*). Figure 91.

Plant 4–6 dm. high; leaves many in a dense pseudobulb, sheaths broadly ovate to suborbicular, dark brown, blades dimorphic, the outer ones reduced to dark brown flat serrate spines, the inner ones green, deciduous, linear, acuminate,

25 cm. long, 1 cm. wide, furfuraceous, soon glabrous above; scape erect, slender, floccose-lepidote; scape-bracts foliaceous, longer or shorter than the internodes; inflorescence laxly racemose, 20–25 cm. long; floral bracts ovate, acute or acuminate, exceeding the pedicels, thin, floccose; pedicels about 1 cm. long; sepals lanceolate acute, 25–30 mm. long, carinate, glabrous; petals linear, obtuse, red; stamens barely exserted; ovary over half superior; ovules long-caudate.

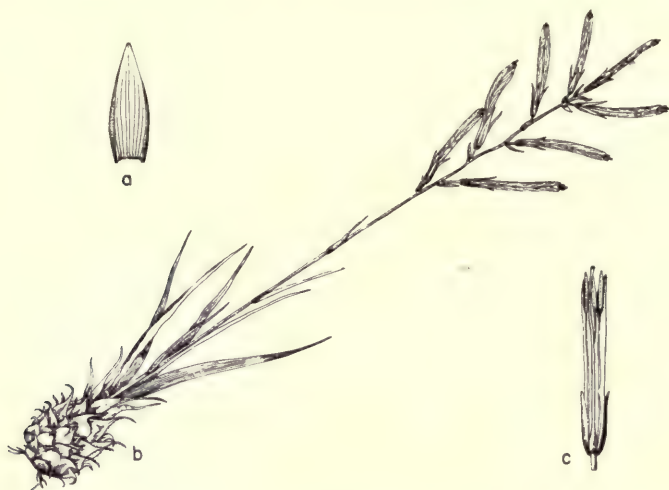


FIG. 91. *Pitcairnia Tuerckheimii*. a, Floral bract ( $\times \frac{2}{3}$ ). b, Habit ( $\times \frac{1}{6}$ ). c, Flower ( $\times \frac{1}{3}$ ).

***Pitcairnia Tuerckheimii* var. *macrolepis* L. B. Smith**, Lilloa 6: 383. 1941 (type from San Miguel Acatán, Dept. Huehuetenango, 2080 meters, *Skutch 995*).

Leaves 10–22 mm. wide; axis of the inflorescence stout, densely white-floccose; floral bracts much exceeding the pedicels; sepals to 33 mm. long, alate.

***Pitcairnia Wendlandi* Baker**, Jour. Bot. 19: 306. 1881. *Puya sulphurea* Hook. Bot. Mag. pl. 4696. 1853 (described from cultivated material of unknown origin). *Neumannia sulphurea* K. Koch, Ind. Sem. Hort. Berol. 1856: App. 2. 1857. *Pitcairnia sulfurea* Mez in DC. Monog. Phan. 9: 456. 1896 (doubtfully assigned to Guatemala), not Andr. 1802.

Guatemala(?). Costa Rica. *Aguilar 1643* from Escuintla is probably this species but is too incomplete for certain determination.



Plant 10–15 dm. high; rhizome 15–20 cm. long; leaf-sheaths triangular-ovate, brown, petioles 1 cm. wide, to 3 dm. long, blades lanceolate, acuminate, 5–11 dm. long, 50–85 mm. wide, glabrous; scape erect, stout; scape-bracts densely imbricate, elliptic, acute; inflorescence densely spiciform, 2–5 dm. long, 3–6 cm. thick; floral bracts about 6-ranked, broadly ovate with a short triangular blade, 5 cm. long; flowers subsessile; sepals lance-oblong, abruptly acute, to 3 cm. long, glabrous; petals 7 cm. long, yellow; ovary almost wholly superior.

## TILLANDSIA L.

Caulесcent or acaulescent herbs of very variable habit; leaves rosulate or fasciculate or distributed along a stem, polystichous or distichous, entire, blades ligulate or subtriangular or filiform; scape usually evident; inflorescence various, usually of distichous-flowered spikes or sometimes reduced to a single polystichous-flowered spike by the reduction of the spikes to single flowers or rarely the whole inflorescence reduced to a single flower; flowers perfect; sepals usually symmetric, free or equally or posteriorly joined; petals free, naked; stamens of various lengths relative to the petals and pistil; ovary superior, glabrous; capsule septicidal; seeds erect, narrowly cylindric or fusiform, the plumose appendage white, straight, basal.

About 350 species in tropical and warm-temperate America.

Standley notes: In the mountains of Guatemala, particularly the pine-oak forests, Tillandsias are abundant and varied in many places. Wherever fogs are customary at night, these plants abound. If there are no fogs, the plants are few or none. The various species are often grown for ornament in gardens, in pots or on branches. The species with showy inflorescences (red bracts) are known commonly by the name "pie de gallo" (rooster foot). They are used in great quantities for Christmas decorations, and for altars and interiors at other times of the year. For such purposes they last a long time before discoloring. Other names given to the plants in Guatemala are "gallos" and "gallinas."

Sepals asymmetric, free, oblong or broadest near the apex, not over 8 mm. long, equaling or shorter than the floral bracts.

Floral bracts less than 10 mm. long; spikes dense, strict . . . . . *T. Rothschildiana*

Floral bracts over 10 mm. long.

Branches erect or ascending; floral bracts erect, densely imbricate.

*T. adscendens*

Branches spreading or subspreading; floral bracts spreading, not at all imbricate . . . . . *T. Ghiesbreghtii*

Sepals symmetric or, if slightly asymmetric, ovate or lanceolate and broadest near the base.

Plant caulescent; leaf-blades linear or very narrowly triangular; inflorescence simple.

Leaves polystichous; scape-bracts imbricate and concealing the scape.

*T. Schiedeana*

Leaves distichous; scape nearly or quite naked or lacking.

Stem not more than 1 dm. long, wholly concealed by the imbricate leaf-sheaths; inflorescence terminal. . . . . *T. recurvata*

Stem elongate, often several meters long, exposed between alternating bunches of leaves; inflorescence pseudo-lateral, one-flowered.

*T. usneoides*

Plant stemless with rosulate or fasciculate leaves, sometimes bearing scaly rhizomes or stolons.

Flowers secund (cf. fruiting material of *Vriesia gladioliflora*, *graminifolia*, *Schippii*, *pectinata* or *Werckleana*).

Flowers not secund.

Sheaths of the primary bracts shorter than the axillary branches, or the inflorescence simple and distichous-flowered.

Flowers not imbricate at anthesis.

Floral bracts more than twice as long as the internodes, but the flowers spreading so that they are not imbricate.

Leaf-blades ligulate, 3-7 cm. wide; floral bracts 3-5 cm. long, shorter than the sepals. . . . . *T. grandis*

Leaf-blades narrowly triangular, 10-15 mm. wide; floral bracts 17 mm. long, equaling the sepals. . . . . *T. monadelphæ*

Floral bracts less than twice as long as the internodes.

Leaf-blades linear, 1-2 mm. wide; plants not over 3 dm. high.

Inflorescence simple, few-flowered; sepals 14 mm. long.

*T. argentea*

Inflorescence compound, many-flowered; sepals 7-8 mm. long.

*T. filifolia*

Leaf-blades narrowly triangular, 2-7 cm. wide; plants mostly large.

Floral bracts even or at most faintly nerved near the margin; branches usually geniculate. . . . . *T. dasylyriifolia*

Floral bracts prominently nerved throughout; branches merely flexuous in most cases.

Sepals 14-18 mm. long; rhachis slender. . . . . *T. utriculata*

Sepals 25-30 mm. long; rhachis stout. . . . . *T. Makoyana*

Flowers imbricate at anthesis; floral bracts at least twice as long as the internodes.

Leaf-blades ligulate.

Inflorescence compound.

Sepals 24-45 mm. long.

Primary bracts very much larger than the floral bracts; inflorescence amply compound; floral bracts carinate toward apex. . . . . *T. Deppeana*

Primary bracts scarcely larger than the floral bracts; inflorescence few-branched; floral bracts lustrous, inflated, only the lowest at all carinate. . . . . *T. lucida*

Sepals not more than 20 mm. long.

Spikes lanceolate or elliptic, few-flowered, not more than twice as long as their subtending bracts; sepals 15-20 mm. long, ecarinate. . . . . *T. excelsa*

- Spikes linear-lanceolate, 6-26-flowered, more than twice as long as their subtending bracts; sepals mostly less than 15 mm. long, the posterior ones carinate. . . . . *T. guatemalensis*
- Inflorescence simple.
- Floral bracts rugose, slightly if at all carinate (cf. fruiting material of *Vriesia gladioliflora* or *V. pycnantha*).
- Floral bracts even or striate, but not rugose, strongly carinate toward apex.
- Scape-bracts distichous, carinate; floral bracts curved out at mid-keel. . . . . *T. multicaulis*
- Scape-bracts polystichous, ecarinate; floral bracts curved in at mid-keel (cf. fruiting material of *Vriesia heliconioides*).
- Leaf-blades narrowly triangular or linear.
- Leaf-sheaths inflated and forming a pseudobulb, the inner ones closely enfolding the base of the scape or inflorescence.
- Floral bracts even or nerved only near the margin, nearly or quite glabrous, coriaceous; leaves concolorous or purple-margined, appressed-lepidote. . . . . *T. Balbisiana*
- Floral bracts either strongly nerved or densely lepidote or both, chartaceous or subchartaceous.
- Floral bracts densely cinereous-lepidote with coarse spreading or subspreading scales.
- Leaf-blades flat for most of their length, the outer ones spirally recurved. . . . . *T. streptophylla*
- Leaf-blades involute-subulate throughout.
- Scape evident. . . . . *T. Seleriana*
- Scape very short or none. . . . . *T. pruinosa*
- Floral bracts glabrous or appressed-lepidote.
- Leaf-sheaths variegated. . . . . *T. Butzii*
- Leaf-sheaths green, concolorous or with only a narrow marginal band of red or purple.
- Leaf-sheaths orbicular, distinct, making a sharp angle with the blades. . . . . *T. bulbosa*
- Leaf-sheaths ovate or elliptic, merging into the blades.
- Floral bracts nearly or quite glabrous, usually larger than the primary bracts. . . . . *T. caput-Medusae*
- Floral bracts densely lepidote.
- Pseudobulb elongate, one third to one half the total length of the plant. . . . . *T. circinnata*
- Pseudobulb only 2-5 cm. long. . . . . *T. Baileyi*
- Leaf-sheaths nearly flat and forming a crateriform rosette or fasciculate.
- Leaf-blades linear-subulate to filiform; leaves closely fasciculate; leaf-sheaths triangular with abruptly auricled bases.
- Spikes arching-recurved; floral bracts barely imbricate, usually striate. . . . . *T. festucoides*
- Spikes straight, erect.
- Inflorescence densely polystichous-digitate with broad even bracts massed beneath it, equaling or exceeding the leaves. . . . . *T. juncea*



- Inflorescence simple or compound, if dense the primary bracts narrow and not massed beneath it. . . . . *T. tenuifolia*
- Leaf-blades definitely though often very narrowly triangular; leaf-sheaths usually ovate or elliptic without auricled bases.
- Sepals exserted beyond the floral bracts.
- Floral bracts even, coriaceous, lustrous; sepals acute, nearly 3 cm. long. . . . . *T. polita*
- Floral bracts nerved, thin, dull; sepals obtuse, 11 mm. long. . . . . *T. chlorophylla*
- Sepals equaling or shorter than the floral bracts.
- Floral bracts subchartaceous to membranaceous.
- Rhachis concealed by the floral bracts; inflorescence densely digitate or short-pinnate.
- Spikes not more than half fertile; scape very short; floral bracts soon glabrous. . . . . *T. flabellata*
- Spikes more than half fertile; scape evident; floral bracts densely lepidote. . . . . *T. vicentina*
- Rhachis exposed by the floral bracts.
- Spikes 1-2 cm. wide; plants 2-6 dm. high. . . . . *T. Valenzuelana*
- Spikes 12 mm. wide; plants 1 meter high. . . . . *T. elongata* var. *subimbricata*
- Floral bracts coriaceous or subcoriaceous.
- Inflorescence densely pinnate.
- Lower spikes less than twice as long as the sheaths of the primary bracts; floral bracts acute, not cucullate. . . . . *T. ponderosa*
- Lower spikes several times as long as the sheaths of the primary bracts; floral bracts cucullate. . . . . *T. Rodrigueziana*
- Inflorescence digitate or simple, or if rarely pinnate (*T. fasciculata*), then lax.
- Leaf-sheaths longitudinally red-striped. . . . . *T. anceps*
- Leaf-sheaths concolorous or spotted, not striped.
- Leaf-sheaths scarcely if at all darker than the blades; spikes not more than 12 mm. wide. . . . . *T. polystachia*
- Leaf-sheaths much darker than the blades; spikes 12-70 mm. wide.
- Leaf-sheaths bright purple; upper scape-bracts merely apiculate. . . . . *T. lampropoda*
- Leaf-sheaths deep castaneous or ferruginous.
- Spikes terete. . . . . *T. Acostae*
- Spikes more or less complanate.
- Bracts subinvolucrate below the inflorescence; sepals alate. . . . . *T. punctulata*
- Bracts not at all involucrate; sepals carinate but not alate.
- Sides of the spikes more or less convex; floral bracts ample. . . . . *T. fasciculata*

Sides of the spikes flat; floral bracts 9–18 mm. wide; primary bracts scarcely larger than the floral bracts. . . . . *T. tricolor*

Sheaths of at least the lower primary bracts equaling or exceeding the spikes (these sometimes reduced to a single flower each), or the inflorescence simple and polystichous-flowered.

Leaf-blades ligulate.

Inflorescence pendulous, lax; posterior sepals high-connate. . . *T. deflexa*

Inflorescence erect.

Inflorescence simple (cf. fruiting material of *Guzmania lingulata*, *minor*, or *nicaraguensis*).

Inflorescence compound.

Flowers 2 and collateral in the axil of each primary bract (cf. fruiting material of *Vriesia*).

Flowers on elongate axes, obviously distichous.

Sepals 16 mm. long; spikes linear to lanceolate; floral bracts prominently nerved. . . . . *T. Leiboldiana*

Sepals 30 mm. long; spikes broadly lanceolate, 25 mm. wide; floral bracts even or nearly so. . . . . *T. Yunkeri*

Leaf-blades linear or narrowly triangular.

Leaf-blades linear-subulate to filiform, elongate.

Bracts coriaceous, nearly or quite even; leaf-scales suborbicular, subappressed. . . . . *T. juncea*

Bracts membranaceous, nerved; leaf-scales linear, spreading.

*T. plumosa*

Leaf-blades narrowly triangular.

Inflorescence pendulous, lax. . . . . *T. Standleyi*

Inflorescence erect.

Outer bracts of the inflorescence foliaceous.

Scape elongate, stout.

Spikes 2-flowered; floral bracts membranaceous, densely lepidote. . . . . *T. capitata* var. *guzmanoides*

Spikes much more than 2-flowered; floral bracts coriaceous, nearly or quite glabrous. . . . . *T. polystachia*

Scape short to none, slender. . . . . *T. brachycaulos*

Outer bracts of the inflorescence membranaceous, brightly colored.

*T. ionantha*

***Tillandsia Acostae* Mez & Tonduz ex Mez, Repert. Sp. Nov. 14: 252. 1916.**

Epiphytic in forests, 75–1360 meters; Jalapa (vicinity of Jalapa, *Standley 76386*). Costa Rica; Panama.

Plant 20–25 cm. high; leaves many, subspreading, densely rosulate, about equaling the inflorescence, rigid, densely and minutely appressed-lepidote, sheaths prominent, 3–4 cm. long, blades linear-triangular, 10–15 mm. wide; scape short, stout, erect; scape-bracts densely imbricate, foliaceous, subinflated; inflorescence simple or digitate from 2 subequal spikes; primary bracts barely larger than the

floral; spikes linear in outline, acuminate, 7–14 cm. long, 2 cm. thick; floral bracts densely imbricate, suborbicular, apiculate, 2 cm. long, inflated, carinate toward apex, coriaceous, even, glabrous; sepals lanceolate, acute, the posterior much connate; petals tubular-erect, 35 mm. long; stamens exserted.

Scarcely better than a variety of *Tillandsia fasciculata*.

***Tillandsia adscendens*** L. B. Smith, N. Am. Fl. 19: 122. 1938.

Cultivated in Guatemala by Mariano Pacheco and believed to be of native origin (*Standley 63096*). Mexico; Costa Rica.

From 6 to over 10 dm. high; leaves over 3 dm. long, blades ligulate, acute, nearly 4 cm. wide; scape erect, stout; scape-bracts densely imbricate, ovate, acute; inflorescence dense, 4–6 dm. long, very narrow; primary bracts mostly shorter than the branches; spikes linear, complanate, 5–10 cm. long, densely 10–16-flowered; floral bracts very broadly ovate, broadly acute or obtuse, 13–21 mm. long, ecarinate, even, coriaceous, glabrous; sepals broadly obovate, truncate, 8 mm. long; petals shorter than the sepals, yellow.

***Tillandsia anceps*** Lodd. Bot. Cab. 8: pl. 771. 1823. *Phytarrhiza anceps* E. Morren, Belg. Hort. 29: 368. 1879. *Vriesea Schlechtendalii* Wittm. Bot. Jahrb. 11: 69. 1889, excl. syn. *Tillandsia lineatifolia* Mez in DC. Monog. Phan. 9: 686. 1896. Figure 92.

Epiphytic in forest, 70–600 meters; Alta Verapaz; Izabal. Honduras; Costa Rica; Panama; Trinidad; British Guiana; Venezuela; Colombia; Brazil.

Leaves many, densely rosulate, 15–40 cm. long, equaling or exceeding the inflorescence, densely and minutely pale-appressed-lepidote, green, sheaths triangular-ovate, red-striate, blades recurving, linear-triangular, acuminate, 7–12 mm. wide; scape erect, very short, stout; scape-bracts densely imbricate, ovate, acute or the lowest with a stiff erect linear blade, much smaller than the floral bracts, coriaceous, even, glabrous; inflorescence simple, elliptic, strongly complanate, 10–15 cm. long, 55 mm. wide, 10–20-flowered, glabrous; floral bracts densely imbricate, acute, to 4 cm. long, much exceeding the sepals, carinate, coriaceous, even, green or pale rose with greenish margins; sepals subfree, linear-lanceolate, acute, 3 cm. long; petals over 6 cm. long, the blade spreading, lance-elliptic, acute, blue or rarely white; stamens deeply included; capsule slenderly cylindric, shorter than the sepals.

***Tillandsia argentea*** Griseb. Cat. Pl. Cub. 254. 1866. Figure 93.

Epiphytic in forest, 1300–1800 meters; Suchitepéquez; Quiché; Huehuetenango; Quezaltenango; San Marcos. Cuba; Jamaica; Mexico.

Plant 25 cm. high; stem short but often branched; leaves many, densely rosulate, spreading, 6–9 cm. long, densely lepidote, sheaths small and indistinct, blades linear-subulate, 2 mm. wide at base; scape exceeding the leaves, 1 mm.



FIG. 92. *Tillandsia anceps*.  
a, Habit ( $\times \frac{1}{8}$ ). b, Sepal ( $\times 1$ ).



FIG. 93. *Tillandsia argentea*. a, Scape and inflorescence ( $\times 1$ ). b, Leaf ( $\times 1\frac{1}{2}$ ).  
c, Sepal ( $\times 1\frac{1}{2}$ ). d, Flower ( $\times 1\frac{1}{2}$ ).

thick; scape-bracts erect, mostly exceeding the internodes, ovate, caudate or acute, thin, nerved; inflorescence 7 cm. long, laxly to 7-flowered; rhachis geniculate, slender; floral bracts 11 mm. long, broadly elliptic, much shorter than the sepals, membranaceous, red, densely lepidote; flowers subspreading; pedicels 2-5 mm. long; sepals elliptic, obtuse, thin, nerved, lepidote; petals ligulate, obtuse, 3 cm. long, bright red or purple; stamens exserted.

**Tillandsia Baileyi** Rose ex Small, Fl. Se. U. S. 246, 1328. 1903. Figure 94.

Epiphytic, dry slopes, 900-1200 meters; Jutiapa; Guatemala. Texas; Mexico.

Plant stemless, 2-4 dm. high, growing in dense masses; leaves equaling or exceeding the inflorescence, densely appressed-cinereous-lepidote, sheaths ovate, blades contorted, linear, involute-subulate, 5 mm. thick; scape erect or ascending; inflorescence of 1-4 spikes; primary bracts much shorter than the axillary spikes; spikes linear, 4-10 cm. long, 12 mm. wide, subdense, complanate; floral bracts ovate, acute, 2 cm. long, ecarinate, subchartaceous, appressed-cinereous-lepidote, roseate; flowers subsessile; sepals lanceolate, to 16 mm. long, lepidote, short-connate posteriorly; petals 3 cm. long, purple; stamens and pistil exserted.

**Tillandsia Balbisiana** Schultes in R. & S. Syst. Veg. 7: 1212. 1830. Figure 95.

Epiphytic, from near sea level to 1100 meters but chiefly at lower altitudes; Petén; Guatemala; Huehuetenango. Florida; Bahamas; Cuba; Jamaica; Hispaniola; Mexico; Central America; Venezuela.

Plants to 65 cm. high; leaves rosulate, minutely lepidote, sheaths forming a slender pseudobulb up to 12 cm. long, blades sharply spreading or recurved, narrowly triangular, 1 cm. wide, involute; scape erect or ascending, slender; scape-bracts imbricate, the lower subfoliaceous; inflorescence densely compound or rarely simple; sheaths of the primary bracts shorter than the spikes; spikes sessile, linear, complanate, to 12 cm. long and 1 cm. wide; floral bracts imbricate, ovate, 15-22 mm. long, exceeding the sepals, usually glabrous, ecarinate; posterior sepals connate; petals 30-45 mm. long, violet; stamens exserted.

**Tillandsia brachycaulos** Schlecht. Linnaea 18: 422. 1844. *T. cryptantha* Baker, Jour. Bot. 26: 142. 1888. *T. Bradeana* Mez & Tonduz, Repert. Sp. Nov. 14: 252. 1916. *T. flammea* Mez in Engler, Pflanzenreich IV. 32: 478. 1935. Figure 96.

Epiphytic in dry woods, 950-2000 meters and presumably much lower; Petén; Santa Rosa; San Marcos. Southern Mexico; Central America.

Leaves subrosulate, numerous, often secund, to 26 cm. long, exceeding the inflorescence, minutely appressed-lepidote, blades narrowly triangular, 2 cm. wide; scape very short; scape-bracts foliaceous, large, densely imbricate; inflorescence

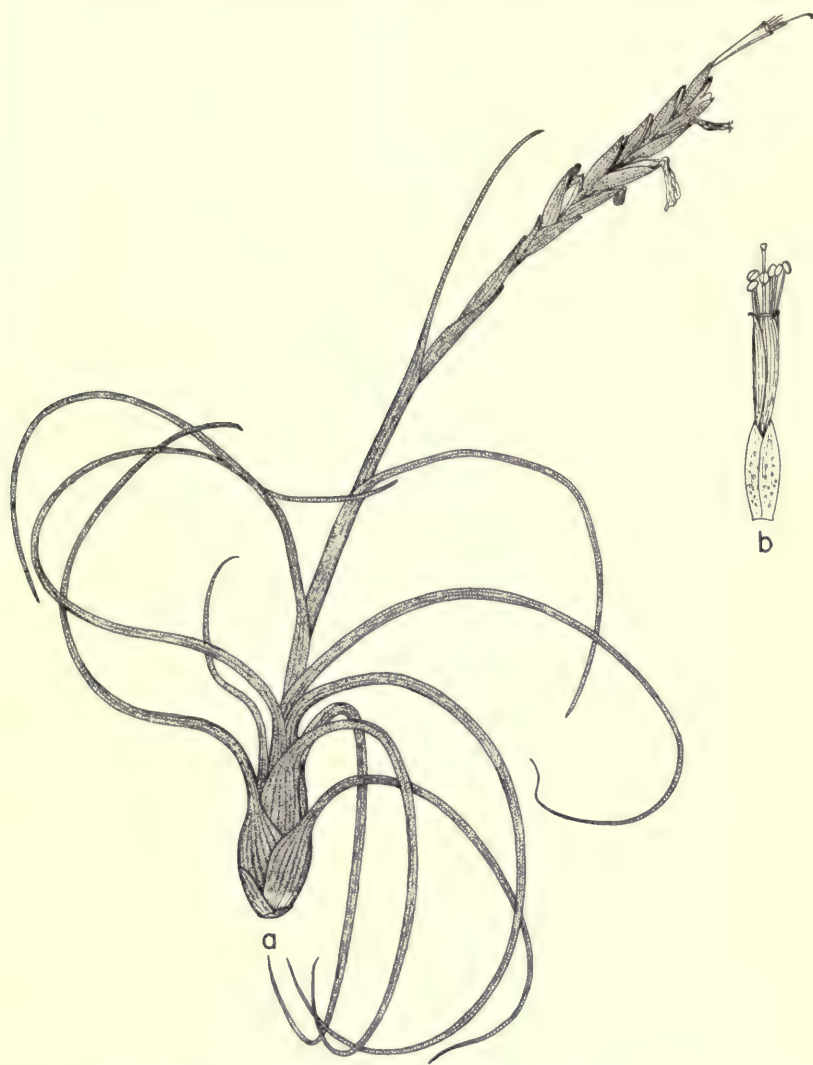


FIG. 94. *Tillandsia Baileyi*. a, Habit ( $\times \frac{1}{2}$ ). b, Flower ( $\times 1$ ).

capitate, compound or appearing simple by the reduction of the spikes to a single flower each; primary bracts foliaceous, hiding the 1-2-flowered spikes; floral bracts lanceolate, thin, equaling the sepals; sepals elliptic, 12-17 mm. long; petals 5-7 cm. long, violet; stamens and pistil exserted.

Known in Yucatan by the Maya names "miz," "chu," and "mexnuxib."





FIG. 95. *Tillandsia Balbisiana*. Habit of plant ( $\times \frac{1}{3}$ ).



FIG. 96. *Tillandsia brachycaulos*. Habit of plant ( $\times \frac{1}{2}$ ).

***Tillandsia brachycaulos* var. *multiflora*** L. B. Smith, Contr. Gray Herb. 154: 35, *pl. 4, f. 3*. 1945.

Epiphytic, 250–400 meters; Zacapa (type and only collection from trail between Río Hondo and waterfall, *Steyermark 29465*).

More robust; spikes elongate, subulax, to 4-flowered.



FIG. 97. *Tillandsia bulbosa*. Habit of plant ( $\times \frac{1}{2}$ ).

***Tillandsia bulbosa*** Hook. Exot. Fl. *pl. 173*. 1826. Figure 97.

Epiphytic at low altitudes in forests and thickets especially near coast, 2–700 meters; Petén; Alta Verapaz; Izabal. Southern Mexico and the West Indies to Colombia and Brazil.

Plants usually in dense masses; leaves few, covered with minute appressed cinereous scales, sheaths forming an ovoid pseudobulb, 2–5 cm. long, blades involute-subulate, contorted, to 3 dm. long; scape short, erect; scape-bracts foliaceous, elongate; inflorescence simple or of few spikes; primary bracts sub-foliaceous but their sheaths shorter than the spikes; spikes lanceolate, com-

planate, 2-5 cm. long; floral bracts imbricate, ovate, acute, 15 mm. long, appressed-lepidote; sepals oblong, apiculate, 13 mm. long; petals 3-4 cm. long, blue or violet; stamens exserted.

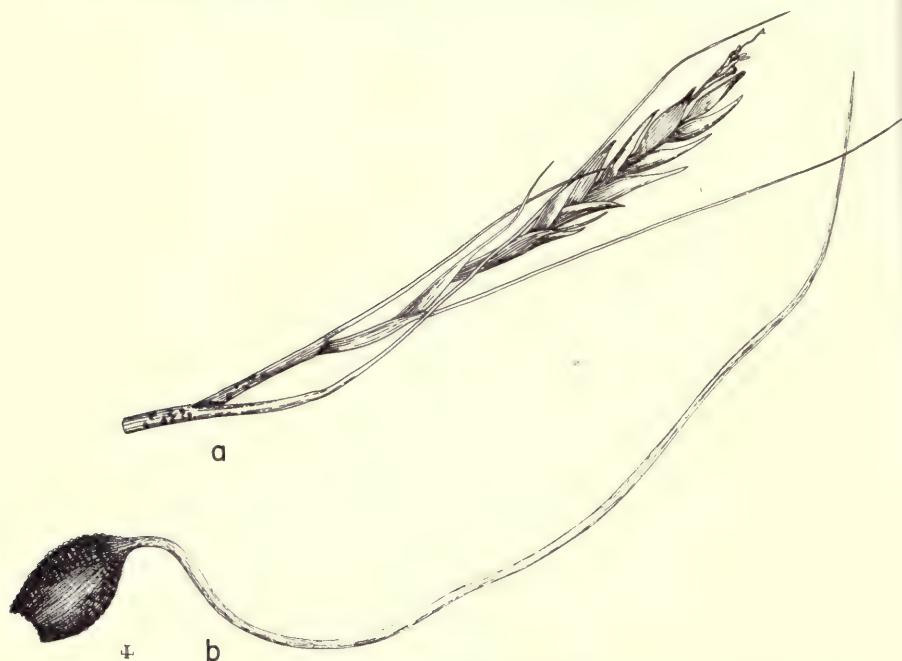


FIG. 98. *Tillandsia Butzii*. a, Scape and inflorescence ( $\times \frac{1}{2}$ ). b, Leaf ( $\times \frac{1}{2}$ ).

***Tillandsia Butzii*** Mez in Engler, Pflanzenreich IV. 32: 636. 1935. *T. variegata* Schlecht. Linnaea 18: 429. 1844, not Vell. 1825. *Pie de gallo* (Quezaltenango). Figure 98.

Epiphytic, 1300-2300 meters; Alta Verapaz; Baja Verapaz; El Progreso; Zacapa; Chiquimula; Jalapa; Santa Rosa; Suchitepéquez; Quiché; Huehuetenango; Quezaltenango; San Marcos. Southern Mexico; Central America.

Plant 2-3 dm. high; leaves few, up to 5 dm. long, finely appressed-lepidote, sheaths suborbicular, forming a pseudobulb 25-45 mm. thick, dark brown or purple with coarse irregular pale green mottling, blades contorted, involute-subulate, 3 mm. thick; scape erect, slender; scape-bracts foliaceous, imbricate; inflorescence digitate or rarely simple; primary bracts subfoliaceous, their sheaths much shorter than the spikes; spikes linear, complanate, 6-8 cm. long, 1 cm. wide; floral bracts imbricate, ovate, acute, 20-28 mm. long, exceeding the sepals; sepals obtuse; petals 30-35 mm. long, violet; stamens exserted.



***Tillandsia capitata*** Griseb. Cat. Pl. Cub. 255. 1866. A species of Cuba and southern Mexico, represented in Guatemala by the following variety:

***Tillandsia capitata* var. *guzmanioides*** L. B. Smith, Contr. Gray Herb. 127: 18, pl. 1, f. 5-7. 1939. *Tun-ek* (Huehuetenango); *Gallo* (San Marcos).

Epiphytic in woods or cloud forest, 2500-3800 meters; Jalapa; Chimaltenango; Huehuetenango. Southern Mexico.

Stemless, to 5 dm. high; leaves many in a cyathiform rosette, about equaling the inflorescence, densely fine-lepidote, sheaths large, elliptic, dark castaneous, blades narrowly triangular, acuminate, flat, 2 cm. wide; scape curved, 6 mm. thick, soon glabrous; scape-bracts foliaceous, densely imbricate, the upper ones exceeding the inflorescence; inflorescence densely ellipsoid, 7-8 cm. long, bipinnate; primary bracts like the scape-bracts but smaller, concealing the spikes; spikes 2-flowered with 2 broadly winged sterile bracts at base; floral bracts ovate, acute, about equaling the sepals, carinate, membranaceous, densely appressed-brown-lepidote; sepals lanceolate, acute, to 27 mm. long, membranaceous, densely lepidote; petals 35-55 mm. long, tubular-contorted, erect.

***Tillandsia caput-Medusae*** E. Morren, Belg. Hortic. 30: 90. 1880. *Gallito*; *Gallo de monte* (Jutiapa). Figure 99.

Epiphytic, 330-1255 meters; Alta Verapaz; El Progreso; Jutiapa; Santa Rosa; Escuintla; Guatemala; Retalhuleu. Mexico; El Salvador; Honduras; Costa Rica.

Plant 15-40 cm. high; leaves often exceeding the inflorescence, coarsely lepidote, sheaths large, blades involute-subulate, usually contorted, 15 mm. wide; scape erect or nearly so, slender; scape-bracts imbricate, foliaceous; inflorescence simple or digitate from 2-6 spikes; primary bracts usually smaller than the floral bracts and practically bladeless; spikes linear-lanceolate, to 15 cm. long with reduced sterile bracts at base; floral bracts imbricate, lance-ovate, obtuse, ecarinate, to 2 cm. long, equaling or exceeding the sepals, chartaceous; sepals oblong, obtuse, glabrous, the posterior ones connate; petals 3-4 cm. long, violet; stamens exerted.

Often inhabited by ants.

***Tillandsia chlorophylla*** L. B. Smith, N. Am. Fl. 19: 145. 1938. Figure 100.

Epiphytic or saxicolous, 150-600 meters; Petén (type from Monte Santa Teresa, *Lundell 2649*); Alta Verapaz; Izabal. British Honduras.

Leaves rosulate, 5 dm. long, exceeding the inflorescence, obscurely punctulate, sheaths green, blades narrowly triangular, 1 cm. wide; scape erect, slender; scape-bracts imbricate, subfoliaceous, pink; inflorescence of a few spikes; sheaths of the



FIG. 99. *Tillandsia caput-Medusae*. a, Habit of plant ( $\times \frac{1}{2}$ ). b, Compound inflorescence ( $\times \frac{1}{2}$ ).



FIG. 100. *Tillandsia chlorophylla*. a, Inflorescence ( $\times \frac{1}{2}$ ). b, Calyx ( $\times 1$ ).

primary bracts shorter than the spikes; spikes lance-oblong, complanate, 3–5 cm. long; floral bracts erect, elliptic, obtuse, ecarinate, nerved, pink; sepals 11 mm. long, equally short-connate; petals 25 mm. long, purple; stamens exserted.

**Tillandsia circinnata** Schlecht. *Linnaea* 18: 430. 1844. *T. paucifolia* Baker, *Gard. Chron.* II. 10: 748. 1878. *T. yucatana* Baker, *Jour. Bot.* 25: 280. 1887. *T. intermedia* Mez, *Bull. Herb. Boiss.* II. 3: 141. 1903. *Gallo* (Zacapa).

Epiphytic, dry slopes; 350–400 meters; Zacapa; Chiquimula. Southern Florida; Bahamas; Cuba; Hispaniola; Mexico.

Stemless or pseudocauliscent by the repeated proliferation of the inflorescences, 10–45 cm. high; leaves thick, covered with coarse appressed cinereous scales, sheaths forming a slender pseudobulb 5–15 cm. long, blades involute-subulate, to 2 dm. long, 3–7 mm. thick, contorted; scape erect; scape-bracts imbricate, foliaceous; inflorescence simple or of a few spikes; primary bracts like the scape-bracts but their sheaths always shorter than the spikes; spikes erect or suberect, linear-lanceolate, 2–10-flowered; floral bracts imbricate, elliptic, acute, scarcely carinate, 16–30 mm. long, exceeding the sepals, thin; sepals lance-oblong, acute, thin, posteriorly connate; petals linear, erect, violet; stamens exserted; capsule slenderly cylindric, 4 cm. long.

The Guatemalan material has rather smaller floral bracts than average.

**Tillandsia dasyliiriifolia** Baker, *Jour. Bot.* 25: 304. 1887. *T. drepanoclada* Baker, *Handb. Bromel.* 188. 1889. *T. geniculata* and *T. pulvinata* Baker, *op. cit.* 190.

Epiphytic, saxicolous or terrestrial, 2–150 meters; Petén; Alta Verapaz; Izabal. Southern Mexico; British Honduras; El Salvador; Honduras.

Stemless, up to 1.7 meters high; leaves 7–9 dm. long, densely appressed-lepidote, blades narrowly triangular, 6 cm. wide; scape erect, elongate; inflorescence lax, usually amply paniculate, glabrous; primary bracts short; branches suberect, up to 45 cm. long, laxly flowered; rhachis stout; floral bracts broadly ovate, ecarinate, shorter than the sepals, coriaceous; flowers erect; sepals obtuse, 25 mm. long; petals 3–4 cm. long, white or greenish; stamens exserted.

**Tillandsia deflexa** L. B. Smith, *Contr. Gray Herb.* 154: 35, *pl.* 4, *f.* 4–5. 1945.

Epiphytic, 1400–1700 meters; endemic; San Marcos (type and only specimen from south slopes of Volcán Tajumulco, *Steyermark* 37390).

Leaves in a crateriform rosette, to 8 dm. long, sheaths elliptic, green, obscurely punctulate-lepidote, blades ligulate, acuminate, 35 mm. wide, glabrous above,



punctulate-lepidote beneath; scape 4 dm. long; scape-bracts foliaceous, erect, very densely imbricate; inflorescence laxly bipinnate, 2 dm. long, glabrous; lower primary bracts subfoliaceous, their sheaths equaling or exceeding the spikes; spikes spreading, lanceolate, acute, complanate, 6-7 cm. long, barely 2 cm. wide, about 6-flowered; floral bracts erect, densely imbricate, lanceolate, acute, 5 cm. or longer, sharply carinate, subcoriaceous, rather lustrous; flowers sessile; sepals linear-lanceolate, acute, 28 mm. long, posteriorly connate to above the middle; capsule about equaling the sepals.

**Tillandsia Deppeana** Steud. Nomencl. Bot. ed. 2. 2: 688. 1841. *T. paniculata* Schlecht. & Cham. Linnaea 6: 54. 1831, not L. 1762. *T. leiochlamys* Baker, Handb. Bromel. 184. 1889. *T. rubra* sensu L. B. Smith, Contr. Gray Herb. 95: 46. 1931, not R. & P. 1802.

Epiphytic, 1150-1300 meters; Alta Verapaz; Huehuetenango. Mexico and the West Indies to Venezuela, Peru, and Bolivia.

Stemless, 1-2 meters high; leaves 6-10 dm. long, blades ligulate, acuminate, to 8 cm. wide, nearly or quite glabrous; scape stout, erect; scape-bracts foliaceous, densely imbricate; inflorescence laxly paniculate; primary bracts like the upper scape-bracts, much shorter than the axillary branches but much larger than the floral bracts; spikes lanceolate, acute, complanate, densely 6-28-flowered, 1-3 dm. long, 5 cm. wide, often spreading or recurved; floral bracts carinate, about equaling the sepals, coriaceous, even, glabrous; sepals oblong-lanceolate, 25-45 mm. long, carinate, equally subfree; petals slightly exceeding the stamens.

**Tillandsia elongata** HBK. var. **subimbricata** (Baker) L. B. Smith, Jour. Wash. Acad. 43: 68. 1953. *T. subimbricata* Baker, Jour. Bot. 25: 304. 1887. Figure 101.

Epiphytic at low altitudes; Yucatan; Nicaragua; Panama; Cuba; Jamaica; Trinidad; Venezuela; Colombia; presumably extending into Guatemala.

Leaves rosulate, 8 dm. long, densely punctulate-lepidote, sheaths large, ovate, blades narrowly triangular, 4 cm. wide; scape erect; scape-bracts imbricate, the lower foliaceous; inflorescence laxly compound; primary bracts ovate, apiculate, very short; spikes linear, complanate, 15 cm. long, bracteate at base; floral bracts narrowly ovate, 2 cm. long, exceeding the sepals, glabrous, nerved; sepals obtuse, elliptic; petals 25 mm. long, blue or lilac; stamens included.

Typical *Tillandsia elongata* has longer spikes with as many as 40 flowers each and the floral bracts and sepals are only about three-quarters as long as in the variety *subimbricata*. Typical *Tillandsia elongata* is known only from Colombia but there it intergrades completely with the variety.

**Tillandsia excelsa** Griseb. Fl. Brit. W. Ind. 597. 1864. *T. costaricana* Mez & Wercklé, Bull. Herb. Boiss. II. 3: 143. 1903.

FIG. 101. *Tillandsia elongata* var. *subimbricata*.  
Portion of inflorescence and leaf ( $\times \frac{1}{8}$ ).



Epiphytic in forest, 1350 meters; Cobán. Central America; Cuba; Jamaica.

Often over 1 meter high; leaves rosulate, 45 cm. long, obscurely lepidote, blades ligulate, acute, to 6 cm. wide; scape erect; scape-bracts foliaceous and concealing the scape; inflorescence amply paniculate, pyramidal, glabrous; primary bracts foliaceous, large; spikes densely 8-flowered; floral bracts imbricate but exposing the rhachis, narrowly elliptic, acute, ecarinate, exceeding the sepals; sepals narrowly lanceolate, acute; petals 30 mm. long, violet; stamens included.

***Tillandsia fasciculata*** Sw. Prod. 56. 1788. *T. compressa* Bert. ex Schultes in R. & S. Syst. 7: 1210. 1830. *T. setacea* sensu Hook. Bot. Mag. pl. 3275. 1833, not Sw. 1797. *Vriesia glaucophylla* Hook. Bot. Mag. pl. 4415. 1848. *Tillandsia glaucophylla* Baker, Jour. Bot. 25: 243. 1887. *T. pungens* Mez in DC. Monogr. Phan. 9: 684. 1896. *Pie de gallo* (Jutiapa, Quezaltenango); *Gallito* (Jalapa). Figure 102.

Common epiphyte, usually in dry thickets or woods; 600–1900 meters; Petén; Baja Verapaz; Zacapa; Jalapa; Jutiapa; Santa Rosa; Escuintla; Guatemala; Sololá; Huehuetenango; Quezaltenango. Florida; West Indies; Mexico; Central America; Trinidad; Guiana; Colombia.

Plant 2–10 dm. high; leaves rosulate, sheaths large, ovate, blades narrowly triangular, 2–3 cm. wide, finely lepidote; scape erect, stout; scape-bracts imbricate.

cate, the lower ones foliaceous; inflorescence simple or few-branched; primary bracts shorter than the spikes; spikes sessile or subsessile, erect, bracteate at base, usually over 1 dm. long, strongly complanate; floral bracts imbricate, broad, acute, 2–4 cm. long, nearly or quite even, coriaceous, carinate, glabrous or subglabrous, usually exceeding the sepals; posterior sepals connate; petals 6 cm. long, white to purple; stamens exserted.

Known in Yucatan by the Maya names "chuc," "xolohbenal," and "canazihil."

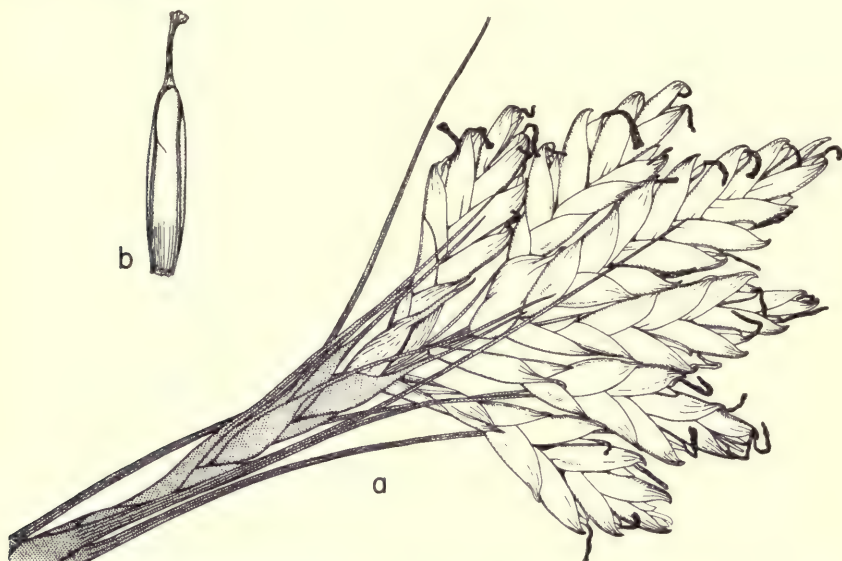


FIG. 102. *Tillandsia fasciculata*. a, Inflorescence ( $\times \frac{1}{2}$ ). b, Flower ( $\times 1$ ).

***Tillandsia fasciculata* var. *convexispica*** Mez in DC. Monogr. Phan. 9: 682. 1896.

Epiphytic in dry thickets, 300–1400 meters; Petén; Jalapa; Guatemala. Mexico; British Honduras; Panama; Jamaica.

Spikes only slightly complanate; floral bracts up to 5 cm. long.

***Tillandsia fasciculata* var. *rotundata*** L. B. Smith, Contr. Gray Herb. 154: 36, pl. 4, f. 6–7. 1945.

Epiphytic in forest, 1350–1600 meters; Zacapa; Huehuetenango (type from Carrizal, *Steiermark* 50809). Honduras.

Inflorescence globose; primary bracts suborbicular, apiculate; spikes ovate, complanate, 4–6 cm. long; floral bracts cucullate, more or less rugose when dry.



**Tillandsia festucoides** Brongn. ex Mez in DC. Monogr. Phan. 9: 678. 1896. *T. caricifolia* E. Morr. ex Mez, op. cit. 672. Figure 103.

Epiphytic, 60–600 meters; Petén; Alta Verapaz; Izabal. Florida (Mez!); Greater Antilles; southern Mexico; Central America.



FIG. 103. *Tillandsia festucoides*. Inflorescence ( $\times \frac{1}{2}$ ).

Plant stemless, to 55 cm. high; leaves minutely appressed-lepidote, sheaths narrow, blades linear-subulate to filiform; scape erect or ascending, slender; scape-bracts imbricate, the lower foliaceous; inflorescence digitate, up to 17 cm. long; primary bracts filiform-laminate, their sheaths shorter than the spikes; spikes linear, 3–9 cm. long; floral bracts lance-ovate, 17–22 mm. long, carinate; sepals 17 mm. long, connate posteriorly; petals 3 cm. long, purple; stamens exserted.

**Tillandsia filifolia** Schlecht. & Cham. Linnaea 6: 53. 1831.

Epiphytic in dense forest, 100–300 meters; Petén; Alta Verapaz; Izabal; Huehuetenango. Southern Mexico; British Honduras; Honduras; Costa Rica.

Plant 30 cm. high; leaves many in a dense rosette, 15–30 cm. long, cinereous-lepidote, blades filiform, 1 mm. broad; scape 1 mm. thick; scape-bracts barely imbricate; inflorescence laxly paniculate, 15 cm. long; primary bracts very short; spikes laxly 10–16-flowered; rhachis very slender, flexuous; floral bracts elliptic, 7–8 mm. long, thin, strongly nerved; flowers suberect; sepals elliptic; petals 10 mm. long, pale lilac; stamens barely exserted.

**Tillandsia flabellata** Baker, Jour. Bot. 25: 242. 1887. *Gallito* (Santa Rosa).

Epiphytic in wet or dry forest, 100–1300 meters; Zacapa; Santa Rosa; Escuintla; Guatemala; Sacatepéquez; Sacatepéquez-Chimaltenango boundary (type from Barranco Hondo, Volcán de Fuego, *Salvin*); Sololá; Suchitepéquez; Quezaltenango; San Marcos. Mexico; El Salvador.

Stemless, 2–5 dm. high; leaves many, spreading, 35–50 cm. long, appressed-lepidote, sheaths broadly ovate, nearly flat, blades narrowly triangular, flat, 17–25 mm. wide; scape very short and hidden by the leaves; scape-bracts large, foliaceous, densely imbricate; inflorescence digitate from 3–10 spikes; primary bracts foliaceous, their sheaths much shorter than the spikes; spikes very narrowly clavate, strongly complanate, 15–29 cm. long; floral bracts lanceolate, acuminate, carinate, 25–40 mm. long, thin, soon glabrous; sepals free, 15 mm. long, obtuse; petals 4 cm. long, violet; stamens exserted.

***Tillandsia Ghiesbreghtii* Baker, Handb. Bromel. 206. 1889.**

Epiphytic, 1360–1500 meters; Alta Verapaz; Huehuetenango. Southern Mexico.

To over 1 meter high; leaves densely rosulate, 3–5 dm. long, obscurely lepidote, sheaths ovate, brown, blades ligulate, acute, 3–5 cm. wide; scape erect, glabrous; scape-bracts imbricate, lanceolate, acute; inflorescence 3 to over 5 dm. long, lax, distichous, bipinnate or the lowest branches sometimes divided; primary bracts like the scape-bracts, to 5 cm. long; spikes often arcuate, to 15 cm. long, bearing 1–4 sterile bracts at base; floral bracts 12–14 mm. long, much exceeding the sepals and internodes, obtuse, ecarinate, even or nearly so, coriaceous, glabrous; flowers subsessile; sepals elliptic, 7–8 mm. long; petals exserted 2 mm., white or yellowish; stamens included.

***Tillandsia grandis* Schlecht. Linnaea 18: 424. 1844. *Platy-stachys viridiflora* Beer, Bromel. 81. 1857. *Tillandsia macropetala* Wawra, Wiener Ill. Gartenzeit. 12: 241. 1887. *T. viridiflora* Baker, Jour. Bot. 26: 81. 1888. *T. orizabensis* Baker, op. cit. 105. *T. longiflora* Sessé & Moc. Fl. Mex. ed. 2. 81. 1894. *T. virginalis* sensu Wittm. Gartenflora 44: 398, fig. 87–88. 1895, not E. Morren, 1880. Figure 104.**

Epiphytic or saxicolous, 800–1800 meters; Alta Verapaz; San Marcos. Southern Mexico; British Honduras.

Plant 5–20 dm. high; leaves many in a dense rosette, suberect or curved-spreading, 35–75 cm. long, glaucous below when fresh, sheaths ovate, distinct, brown-punctulate, blades acute or acuminate, 3–7 cm. wide, glabrous above, obscurely punctulate below, often purplish; scape erect, stout, usually exceeding the leaves; scape-bracts densely imbricate, the lower ones foliaceous with divergent blades, the upper elliptic; inflorescence simple or pinnate from a few racemes, glaucous when fresh; primary bracts scarcely larger than the floral bracts; racemes spreading or ascending, long-stipitate with several sterile bracts



FIG. 104. *Tillandsia grandis*. a, Leaf ( $\times \frac{1}{2}$ ). b, Upper portion of inflorescence ( $\times \frac{1}{2}$ ). c, Habit ( $\times \frac{1}{4}$ ).



at base, oblong, to 3 dm. long, 6–7 cm. wide; floral bracts enfolding the base of the calyx, broadly ovate or elliptic, acute or obtuse, 3–5 cm. long, exceeded by the sepals, ecarinate, coriaceous, even, glabrous; flowers divergent at anthesis; pedicels stout, to 1 cm. long; sepals subfree, elliptic, obtuse, 30–45 mm. long, ecarinate, coriaceous, glabrous outside; petals erect at anthesis, then flaccid, linear, obtuse, 8–12 cm. long, green or greenish white; stamens exerted; capsule subcylindric, acuminate, 5–7 cm. long.

**Tillandsia guatemalensis** L. B. Smith, Contr. U. S. Nat. Herb. 29: 281. 1949. *T. cyanea* (A. Dietr.) E. Morren, Belg. Hort. 29: 297. 1879, not Linden ex Koch, 1867. *Allardtia cyanea* A. Dietr. Allg. Gartenz. 20: 241. 1852 (type from Guatemala without further locality). *T. excelsa* sensu Smith & Lundell, Brom. Yucatan Penin. in Carnegie Inst. Washington Publ. 522: 112. 1940, not Griseb. 1864. *Pie de gallo* (Chimaltenango; Guatemala; Sacatepéquez).

Epiphytic in mountain forests, 1200–2600 meters; Zacapa; Jalapa; Santa Rosa; Guatemala; Sacatepéquez; Chimaltenango; Suchitepéquez; Huehuetenango; Quezaltenango; San Marcos. Honduras; El Salvador; Costa Rica.

Up to 1 meter high; leaves many, in a crateriform rosette, 4 dm. long, sheaths conspicuous, ovate or elliptic, pale, brown-punctulate, blades ligulate, acuminate, 2–4 cm. wide, subglabrous, green; scape erect, glabrous; scape-bracts imbricate, foliaceous with divergent to spreading blades; inflorescence usually ample, pinnately compound with at least the lower branches divided, rather lax, narrowly pyramidal or cylindric, 4–8 dm. long; primary bracts lanceolate to broadly ovate with acuminate green blades, red, the lower ones about equaling the branches; branches divergent to spreading, 5–15 cm. long; secondary bracts small; spikes linear-lanceolate, acute, complanate, 6–26-flowered, to 85 mm. long, 10 mm. wide; floral bracts imbricate, elliptic-ovate, obtuse and apiculate, 10–14 mm. long, slightly exceeding the sepals, scarcely carinate, subcoriaceous, nerved, glabrous; flowers short-stipitate; sepals lance-ovate, posteriorly short-connate and carinate; petals linear, obtuse, exceeding the stamens and pistil.

**Tillandsia ionantha** Planch. Fl. Serres 10: 101, *pl. 1006*. 1855. *T. Scopus* Hook. f. Bot. Mag. under *pl. 5892*. 1871. *T. rubentifolia* Poisson & Menet, Bull. Mus. Paris 14: 237. 1908. *T. erubescens* sensu Mez, Pflanzenreich IV. 32: 496, *f. 98*. 1935, not Schlecht. 1844. *Pie de gallo* (Quezaltenango). Figure 105.

Epiphytic in dry forest or chaparral, 650–1300 meters; Chiquimula; Jutiapa; Quezaltenango. Mexico; Nicaragua.

Stemless, usually in dense masses; leaves 30–40, rarely over 6 cm. long, covered with coarse cinereous spreading scales, sheaths elliptic, about half as long as the blade, blades subulate-acuminate, 5 mm. wide, thick, the outer green, the inner red; scape none; inflorescence sessile, terminal, all but the ends of the petals

hidden, appearing simple with polystichous flowers but actually a reduced panicle; primary bracts lance-ovate, acute, equaling or exceeding the sepals, lepidote toward apex; floral bracts like the primary bracts but shorter than the sepals; flowers sessile, erect; sepals free, lanceolate, acute, 16 mm. long, thin; petals tubular-erect, over 4 cm. long, violet; stamens exserted; capsule subcylindric, 3 cm. long.

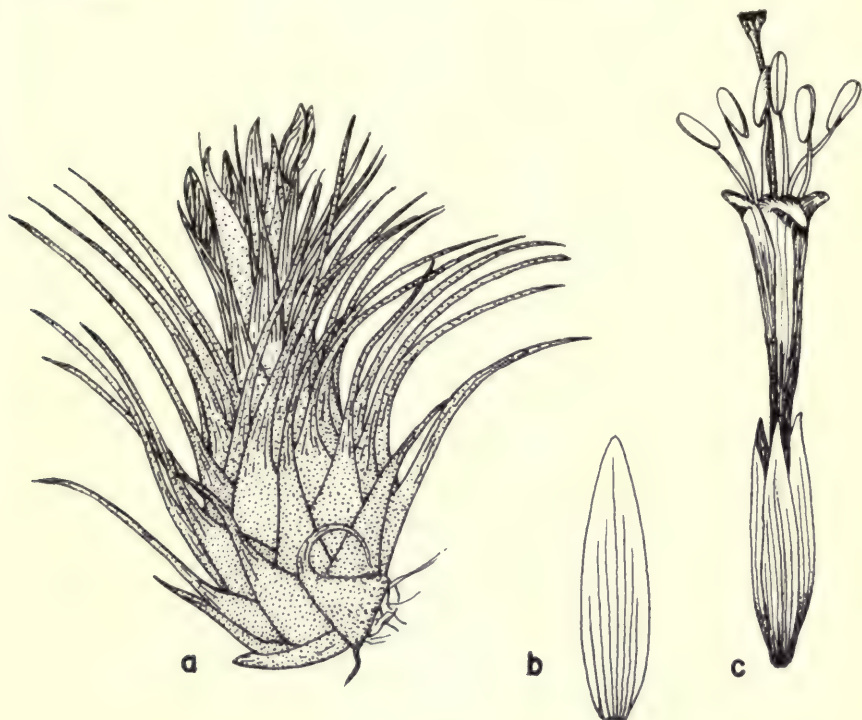


FIG. 105. *Tillandsia ionantha*. a, Habit ( $\times 1$ ). b, Sepal ( $\times 3$ ). c, Flower ( $\times 2$ ).

***Tillandsia ionantha* var. *scaposa*** L. B. Smith, Lilloa 6: 384, pl. 1, f. 7. 1941. *Pie de gallo* (Sacatepéquez).

Epiphytic in forest, 1500–1600 meters; endemic; Escuintla; Sacatepéquez (type from near Antigua, Standley 63065).

Inflorescence raised on a short but distinct scape.

***Tillandsia juncea*** (R. & P.) Poir. in Lam. Encyc. Suppl. 5: 309. 1817. *Bonaparteia juncea* R. & P. Fl. Peruv. 3: 38, pl. 262. 1802. *Tillandsia quadrangularis* Mart. & Gal. Bull. Acad. Brux. 10, pt. 1: 119. 1843. *T. juncifolia* Regel, Gartenflora 23: 321, pl. 811. 1874.

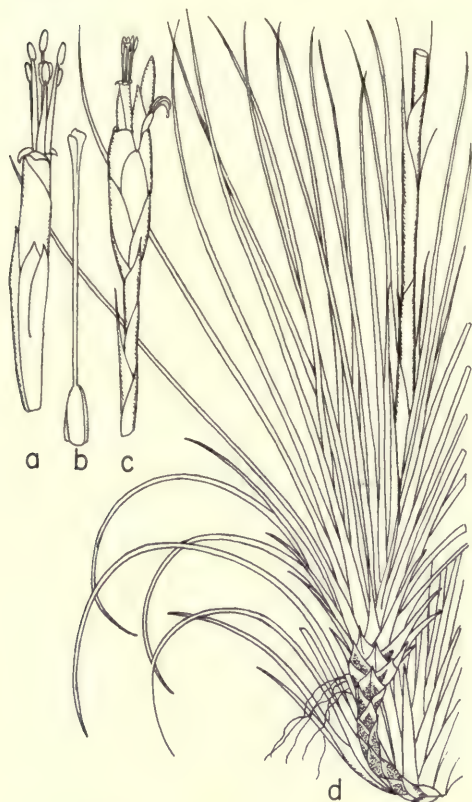


FIG. 106. *Tillandsia juncea*. a, Flower ( $\times 1$ ). b, Pistil ( $\times 1$ ). c, Upper part of inflorescence ( $\times \frac{1}{2}$ ). d, Habit with lower part of inflorescence ( $\times \frac{1}{2}$ ).

*T. setacea* sensu Baker, Jour. Bot. 25: 241. 1887, not Sw. 1797. *Cola de gallo* (Chimaltenango); *Gallito* (Santa Rosa). Figure 106.

Saxicolous or epiphytic in oak or pine forest, 200–2000 meters; Petén; Zacapa; Jalapa; Santa Rosa; Guatemala; Sacatepéquez; Chimaltenango; Huehuetenango. Florida (Mez!); Greater Antilles; southern Mexico to Panama; Trinidad and Colombia to Peru and Bolivia.

Plant 2–4 dm. high, stemless but often bearing scaly rhizomes; leaves densely fasciculate, minutely lepidote, blades linear-subulate; inflorescence densely digitate-compound or rarely simple with polystichous flowers; primary bracts with sheaths shorter than the spikes; spikes stout, up to 4 cm. long; floral bracts densely imbricate, broadly ovate, exceeding the sepals, carinate, densely lepidote; sepals 15–20 mm. long, the posterior ones connate; petals violet, 4 cm. long; stamens exserted.





FIG. 107. *Tillandsia lampropoda*. a, Inflorescence ( $\times \frac{1}{2}$ ). b, Leaf ( $\times \frac{1}{2}$ ). c, Sepal ( $\times \frac{2}{3}$ ).

***Tillandsia lampropoda* L.** B. Smith in Yuncker, Field Mus. Bot. 17: 320, pl. 9. 1938. Figure 107.

Epiphytic in dry pine and oak forest or in cloud forest or in swamp, 1300-2000 meters; Alta Verapaz; Baja Verapaz; Zacapa; Suchitepéquez; Huehuetenango. Honduras.

Stemless, to 50 cm. high; leaves many, in a slenderly cyathiform rosette, 35-40 cm. long, sheaths oblong-elliptic, 1 dm. long, densely and obscurely punc-

tulate-lepidote, blades very narrowly triangular, caudate-acuminate, 15–30 mm. wide, densely appressed-cinereous-lepidote; scape erect; scape-bracts imbricate, broadly ovate, apiculate or the lowest caudate-laminate, even, lustrous, red; inflorescence simple, elliptic, acute, strongly complanate, 15–18 cm. long, 45–70 mm. wide; floral bracts distichous, densely imbricate, broadly ovate, acute, to 55 mm. long, sharply carinate, coriaceous, even, lustrous, yellow or greenish red, cinereous-lepidote toward apex; flowers subsessile; sepals free, narrowly lanceolate, acute, 32 mm. long; petals linear, 5–6 cm. long, equaling the stamens, yellow; style exserted.

**Tillandsia Leiboldiana** Schlecht. *Linnaea* 18: 414. 1844. *T. xiphophylla* and *T. phyllostachya* Baker, *Jour. Bot.* 26: 143. 1888. *T. Aschersoniana* Wittm. *Bot. Jahrb.* 11: 68. 1889. *T. rhodochlamys* Baker, *Handb. Bromel.* 203. 1889. *T. sparsiflora* Baker, *Jour. Bot.* 28: 306. 1890 (type from Serraquitché, Alta Verapaz, *J. D. Smith 1659*). *T. coccinea* Sessé & Moc. *Fl. Mex. ed. 2.* 81. 1894. *T. lilacina* Mez in DC. *Monogr. Phan.* 9: 806. 1896.

Epiphytic in forest, 25–1240 meters; Alta Verapaz; Izabal. Southern Mexico to Costa Rica.

Up to 6 dm. high; leaves rosulate, 1–3 dm. long, blades acute, 25 mm. wide, obscurely lepidote; scape-bracts foliaceous but the upper ones red, imbricate; inflorescence laxly compound, 1–3 dm. long; primary bracts large, usually exceeding the spikes, red or partly green; spikes sessile, narrow, acute, 7-flowered, 6 cm. long; floral bracts imbricate, narrowly ovate, acute, 2 cm. long, carinate, glabrous; sepals lance-oblong; petals 3 cm. long, violet; stamens included.

**Tillandsia lucida** E. Morr. ex Baker, *Handb. Bromel.* 207. 1889.

Described from cultivated material said to have come from Mexico and Guatemala. Southern Mexico.

Plant 6 dm. to over 1 meter high; leaves 3–4 dm. long, punctulate-lepidote, sheaths dark violet or brownish violet inside, pale green outside, blades acute, 3 cm. wide; scape stout; scape-bracts densely imbricate, subfoliaceous with spreading or recurved blades; inflorescence digitate or subpinnate, subfusiform, glabrous; primary bracts broadly ovate; spikes substrict, sessile, oblong, complanate, densely 8–14-flowered; floral bracts broadly elliptic, obtuse, 35 mm. long, exceeding the sepals, lustrous, inflated, only the lowest carinate; sepals narrowly elliptic, obtuse, subfree; petals 6 cm. long, pale blue-violet; stamens included.

**Tillandsia Makoyana** Baker, *Handb. Bromel.* 189. 1889. *T. cucaensis* Wittm. *Bot. Jahrb.* 14: Beibl. 32: 7. 1891 (type from Ocos and Costa Cuca, Quezaltenango, *Bernoulli & Cario 694*).

Epiphytic in pine and oak forests, 1500–1950 meters; Baja Verapaz; Zacapa; Huehuetenango; Quezaltenango. Mexico(?); Honduras; Costa Rica.

Plant 5–10 dm. high; leaves many, densely rosulate, to 65 cm. long, densely appressed-cinereous-lepidote, blades narrowly triangular, 3–5 cm. wide; scape erect, stout; scape-bracts erect, the lower ones imbricate, linear-laminate, the upper lance-ovate, acute, sometimes remote; inflorescence simple to amply bipinnate; primary bracts scarcely larger than the floral bracts; branches to 24 cm. long, laxly flowered; rhachis undulate, glabrous; floral bracts broadly ovate, obtuse, shorter than the sepals, coriaceous, ecarinate; flowers erect and appressed to the rhachis; pedicels 5 mm. long; sepals narrowly elliptic or obovate, obtuse; petals tubular-erect, 5 cm. long, violet or green; stamens exserted; capsule cylindrical, 6–8 cm. long.



FIG. 108. *Tillandsia monadelpha*. Inflorescence with leaf ( $\times \frac{1}{2}$ ).

***Tillandsia monadelpha*** (E. Morren) Baker, Jour. Bot. 25: 281. 1887. *Phytarrhiza monadelpha* E. Morren, Belg. Horticult. 32: 168, pl. 7. 1882. *T. graminifolia* Baker, Jour. Bot. 25: 281. 1887. *Tillandsia monobotrya* Mez, Repert. Sp. Nov. 16: 77. 1919. *T. digitata* sensu Standley, Smithsonian. Misc. Coll. 78, no. 8: 12. 1927, not Mez, 1896. Figure 108.

Epiphytic in wet forest, 25–1000 meters; Alta Verapaz; Izabal. Central America; Colombia and Ecuador to Guiana and Trinidad.

Plant to 35 cm. high; leaves rosulate, 2 dm. long, obscurely lepidote, blades linear-triangular, 10–15 mm. wide; scape erect, slender; scape-bracts imbricate, lance-elliptic; inflorescence oblong, complanate; rhachis exposed, straight, angled; floral bracts ovate, acute, 17 mm. long, about equaling the sepals, carinate, soon glabrous; flowers 3 cm. long; sepals lance-elliptic; petals white with ovate reflexed blade; stamens deeply included, exceeding the style.



**Tillandsia multicaulis** Steud. Nomencl. Bot. ed. 2. 2: 688. 1841. *T. caespitosa* Schlecht. & Cham. Linnaea 6: 54. 1831, not LeConte, 1828. *Vriesea Schlechtendalii* Wittm. Bot. Jahrb. 14: Beibl. 32: 8. 1891. *Pie de gallo de montaña* (Quezaltenango); *Pie de gallo* (San Marcos). Figure 109.

Epiphytic in forest, 1500–2500 meters; Alta Verapaz; El Progreso; Huehuetenango; Quezaltenango; San Marcos. Southern Mexico to Panama.

Leaves densely rosulate, 3–4 dm. long, obscurely lepidote, sheaths large, colored, blades ligulate, acute, 35 mm. wide; scapes several from the leaf-axils, erect, slender; scape-bracts imbricate, distichous, carinate; inflorescences simple, acute, complanate, 14 cm. long, 4–6 cm. wide, glabrous; floral bracts imbricate, sharply carinate, 5 cm. long, rose to bright red; sepals linear-elliptic, 36 mm. long; petals 7 cm. long, blue; stamens exserted.

**Tillandsia plumosa** Baker, Jour. Bot. 26: 13. 1888. *T. Magnusiana* Wittm. Bot. Jahrb. 11: 66. 1889.

Epiphytic, 1400 meters; Baja Verapaz (type of *T. Magnusiana* from above San Miguel and Rabinal, *Lehmann 1467*). Mexico.

Plants in dense masses, to 18 cm. high; leaves very many, in a dense globular rosette, 18 cm. long, sheaths narrow, 1–2 cm. long, thin, blades filiform; scape elongate to almost none, slender; scape-bracts imbricate, elliptic with foliaceous blades, tomentose-lepidote, membranaceous, roseate; inflorescence capitate, compound or simple with polystichous flowers through the reduction of each spike to one flower, 3 cm. thick; primary bracts like the scape-bracts, exceeding the spikes; spikes lanceolate, complanate, 1–3-flowered; floral bracts lanceolate, carinate, about equaling the sepals, spreading-lepidote; sepals lance-ovate, 15 mm. long, lepidote; petals narrow, 18 mm. long, violet, apparently drying to yellow-green.

**Tillandsia polita** L. B. Smith, Lilloa 6: 385, *pl. 1, f. 8–9*. 1941. Figure 110.

Epiphytic in pine and oak woods, 1600–1900 meters; endemic; Zacapa; Jalapa; Quiché (type from between Quiché and San Pedro Jocopilas, *Standley 62465*); Huehuetenango.

Stemless, 45–65 cm. high; leaves many, in a dense rosette, 3–7 dm. long, stiff, thick, sheaths narrowly ovate, dark brown, covered with minute appressed scales, blades very narrowly triangular, acuminate, subpungent, 15 mm. wide, minutely cinereous-lepidote; scape erect, 6 mm. thick, glabrous; scape-bracts densely imbricate, the lower foliaceous, the upper broadly ovate, acuminate, sparsely punctulate-lepidote, even, lustrous; inflorescence bipinnate, thick-fusiform, 11–13 cm. long; primary bracts like the upper scape-bracts, much shorter than the spikes;

spikes suberect, narrowly lanceolate, acute, strongly complanate, bearing several sterile bracts at base, 55–70 mm. long, 15–20 mm. wide, densely 5-flowered; floral bracts erect, 20–30 mm. long, distinctly shorter than the sepals, carinate, slightly incurved, glabrous, even, lustrous, coriaceous, obscurely punctulate-lepidote at



FIG. 109. *Tillandsia multicaulis*. Inflorescence with upper leaves ( $\times \frac{1}{2}$ ).



FIG. 110. *Tillandsia polita*. *a*, Inflorescence and leaf ( $\times \frac{4}{15}$ ). *b*, Flower with bract ( $\times 1\frac{1}{3}$ ).

the apex, bright red when fresh; flowers subsessile; sepals narrowly lanceolate, acute, almost 3 cm. long, sparsely lepidote toward the apex, the posterior ones high-connate; petals violet; stamens exserted.

***Tillandsia polystachia*** L. Sp. Pl. ed. 2. 410. 1762. *Renealmia polystachia* L. Sp. Pl. 286. 1753. *T. angustifolia* Sw. Prodr. 57. 1788. ?*T. acroleuca* Mez & Purpus, Repert. Sp. Nov. 16: 72. 1919. *Ixchuec* (Petén, fide Lundell); *Chooppipin* (Alta Verapaz); *Gallo* (Jalapa).

Epiphytic in dry or wet thickets and forest, 300–2200 meters; Petén; Alta Verapaz; El Progreso; Jalapa; Jutiapa; Santa Rosa; Guatemala; Sacatepéquez; Chimaltenango; Huehuetenango. Mexico to Nicaragua; West Indies; Colombia; Bolivia; Brazil.

Plant 20–65 cm. high; leaves many, in a spreading rosette, finely lepidote, sheaths broad, nearly flat, blades narrowly triangular, 10–25 mm. wide; scape slender; scape-bracts imbricate, foliaceous; inflorescence few-branched or rarely simple; primary bracts usually shorter than the spikes; spikes sessile, erect, 3–10 cm. long, complanate; floral bracts imbricate, broadly ovate, 15–20 mm. long, nearly even and glabrous, about equaling the sepals; posterior sepals short-connate; petals 3 cm. long, violet; stamens exserted.

***Tillandsia ponderosa*** L. B. Smith, Contr. Gray Herb. 154: 37, pl. 4, f. 8–9. 1945. *Tun-ék* (Huehuetenango). Figure 111.

Epiphytic in cloud forests, 2000–2900 meters; endemic; El Progreso; Zacapa (type from Sierra de las Minas, *Steyermark 29797*); Jalapa; Chimaltenango; Huehuetenango.

Plant 7–8 dm. high; leaves rosulate, about equaling the inflorescence, sheaths large, elliptic, yellow-green to purple, punctulate-lepidote, blades linear-triangular, acuminate, 4–5 cm. wide, covered on both sides with appressed cinereous brown-centered scales; scape erect, stout; scape-bracts foliaceous, large, densely imbricate; inflorescence bipinnate, broadly ellipsoid or subglobose; primary bracts suberect, subfoliaceous, their sheaths suborbicular, distinctly shorter than the spikes, their blades exceeding the lower spikes; spikes short-stipitate, broadly lanceolate, acute, complanate, to 15 cm. long, 4 cm. wide, about 8-flowered; floral bracts densely imbricate, to 55 mm. long, exceeding the sepals, elliptic, acute, sharply carinate, slightly incurved, coriaceous, even or faintly nerved, red or orange; sepals oblong, broadly acute, 4–5 cm. long; petals linear, purple; anthers exserted.

***Tillandsia pruinosa*** Sw. Fl. Ind. Occ. 594. 1797. Figure 112.

Epiphytic in forests, 300 meters or less; Petén. Vera Cruz; Costa Rica; Cuba; Jamaica; Hispaniola; Venezuela; Colombia; Ecuador; Brazil.

Plants 8–20 cm. high; leaves to 2 dm. long, sheaths ample, 2–4 cm. long, blades contorted; inflorescence simple or rarely digitate with 2–3 spikes; spikes broad, complanate, to 7 cm. long; floral bracts imbricate, 20–26 mm. long, much exceed-



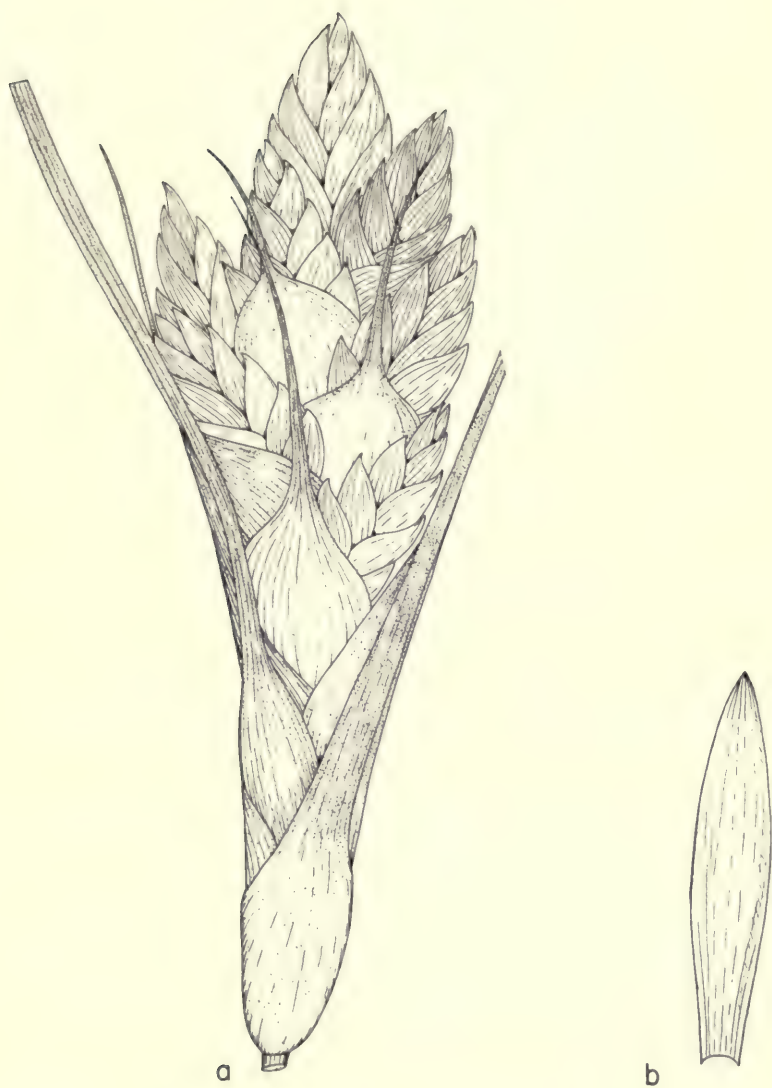


FIG. 111. *Tillandsia ponderosa*. a, Inflorescence ( $\times \frac{1}{2}$ ). b, Sepal ( $\times 1$ ).



FIG. 112. *Tillandsia pruinosa*. a, Habit ( $\times \frac{1}{2}$ ). b, Flower, late stage ( $\times 1$ ).

ing the sepals, carinate; sepals broadly elliptic, obtuse, nearly or quite glabrous; petals 3 cm. long, violet; stamens exserted.

***Tillandsia punctulata*** Schlecht. & Cham. *Linnaea* 6: 53. 1831. *T. tricolor* sensu E. Morr. Belg. Hort. 29: 162, *pl.* 10-11. 1879, not Schlecht. & Cham. 1831. *T. melanopus* E. Morr. ex Mez, DC. Monogr. Phan. 9: 680. 1896. Figure 113.

Epiphytic in wet forest, 350-2300 meters; Alta Verapaz; Baja Verapaz; Izabal; Zacapa; Chiquimula; Jalapa; Huehuetenango; San Marcos. Southern Mexico to Panama.

Plant to 45 cm. high; leaves densely rosulate, minutely lepidote, blades narrowly triangular, 1 cm. wide; scape erect; scape-bracts subfoliaceous, red-brown; inflorescence simple or digitate; primary bracts with short filiform laminae; spikes broad, 7-10 cm. long, slightly complanate; floral bracts densely imbricate, broadly ovate, acute, 4 cm. long, carinate; sepals 30-35 mm. long, alate; petals violet except for the white apex; stamens exserted.

***Tillandsia recurvata*** L. Sp. Pl. ed. 2. 410. 1762. *Renealmia recurvata* L. Sp. Pl. 287. 1753. *Diaphoranthema recurvata* Beer, Bromel. 156. 1857. Figure 114.

Epiphytic in dry thickets and open woods, 5-1500 meters; Baja Verapaz; Chiquimula; Jalapa; Guatemala; Sacatepéquez; Quiché. Extreme southern United States to Argentina and Chile.



FIG. 113. *Tillandsia punctulata*. *a*, Habit ( $\times \frac{1}{3}$ ). *b*, Floral bract ( $\times \frac{1}{3}$ ). *c*, Anterior sepal ( $\times \frac{1}{3}$ ). *d*, Two posterior sepals showing fusion at base ( $\times \frac{1}{3}$ ).

Plants often in dense masses; stems simple or slightly branched, 1–10 cm. long; roots present; leaves 3–17 cm. long, pruinose-lepidote, blades suberect to recurved, linear, terete, 0.5–2 mm. thick; scape to 13 cm. long, 0.5 mm. thick; scape-bracts 1 or 2 just below the inflorescence, linear-lanceolate, lepidote; inflorescence mostly 1–2-flowered; floral bracts like the scape-bracts, about the length of the sepals, lepidote; flowers erect; sepals lanceolate, free, 4–9 mm. long, thin; petals narrow, pale; stamens deeply included, exceeding the pistil.

Abundant in the mountains of Baja Verapaz; about Rabinal and Salamá many shrubs are completely covered with the plants (Standley).

***Tillandsia Rodrigueziana* Mez, Repert. Sp. Nov. 16: 73. 1919.**

Epiphytic in dry oak and pine woods, 1500–1800 meters; endemic; Baja Verapaz; Santa Rosa; Sacatepéquez; Chimaltenango; Sololá.





FIG. 114. *Tillandsia recurvata*. a, Habit ( $\times \frac{3}{4}$ ). b, Petal, pistil, and two stamens ( $\times 7\frac{1}{2}$ ).

Over 1 meter high; leaves 5 dm. long, appressed-canescens-lepidote, blades involute-subulate, rigid, acuminate, 35 mm. wide at base; scape erect, stout; scape-bracts densely imbricate, broadly ovate, foliaceous-laminate; inflorescence to 4 dm. long and 2 dm. thick; primary bracts like the scape-bracts but with short laminae or none; spikes sessile, erect or suberect, lance-oblong, complanate, 12-20-flowered, to 12 cm. long; floral bracts densely imbricate, ovate, alate-carinate, 2 cm. long, equaling the sepals, coriaceous, even, glabrous; sepals elliptic, obtuse, the posterior ones half-connate; petals 4 cm. long; stamens exserted.

***Tillandsia Rothschuhiana*** Mez, DC. Monog. Phan. 9: 645. 1896, in key; Bot. Jahrb. 30: Beibl. 67: 8. 1901. *T. spiculosa* var. *Rothschuhiana* L. B. Smith, Contr. Gray Herb. 89: 14. 1930. Figure 115.

Epiphytic in forests, 800-1300 meters; British Honduras (Toledo District, British Honduras-Guatemala boundary survey, *Schipp S-813*); Nicaragua; Costa Rica; doubtless extending into Guatemala.

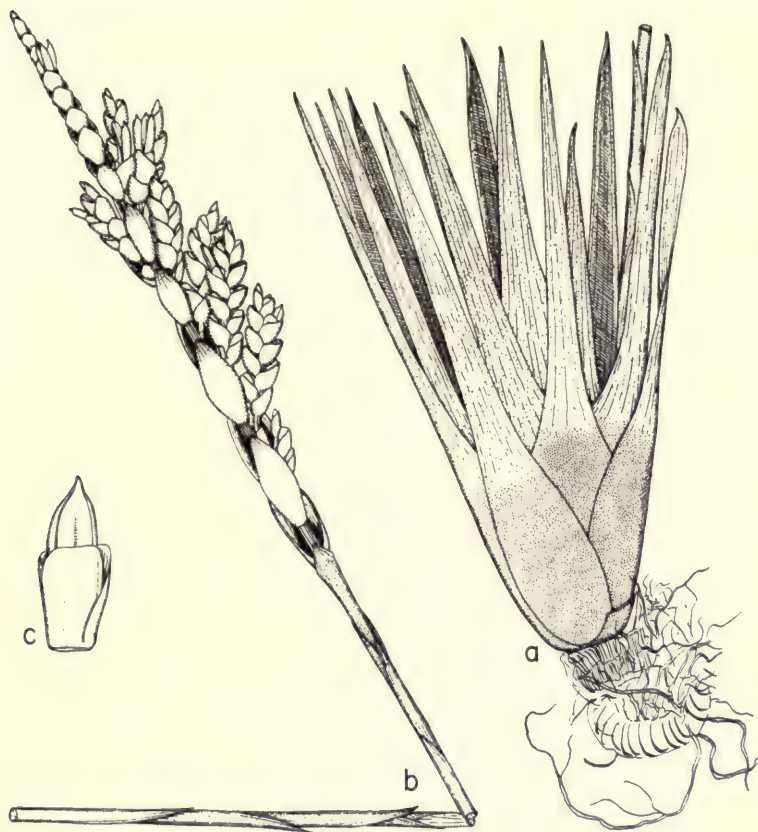


FIG. 115. *Tillandsia Rothschildiana*. a, Leaf-rosette ( $\times \frac{1}{2}$ ). b, Scape and inflorescence ( $\times \frac{1}{2}$ ). c, Calyx and capsule ( $\times 1\frac{1}{2}$ ).

Plant 45–55 cm. high; leaves rosulate, 25 cm. long, finely appressed-lepidote, blades ligulate, acute, 2 cm. wide; scape erect; scape-bracts imbricate, elliptic, acute; inflorescence densely paniculate, 15 cm. long; primary bracts shorter than the spikes; spikes 5 cm. long, 10-flowered; floral bracts imbricate, very broadly ovate, obtuse, 9 mm. long, ecarinate, even, glabrous; sepals obovate, truncate, 7 mm. long.

***Tillandsia Schiedeana*** Steud. Nomencl. Bot. ed. 2. 2: 688. 1841. *T. vestita* Schlecht. & Cham. Linnaea 6: 52. 1831, not Willd. 1830. Figure 116.

Epiphytic in chaparral and in oak and pine woods, saxicolous; 60–1800 meters; Petén; Alta Verapaz; Baja Verapaz; Izabal; El Pro-



FIG. 116. *Tillandsia Schiedeana*. Habit ( $\times \frac{1}{2}$ ).

greso; Zacapa; Chiquimula; Jalapa; Jutiapa; Guatemala; Sacatepéquez; Chimaltenango; Retalhuleu; Huehuetenango. West Indies; Mexico to Colombia and Venezuela.

Plant to 4 dm. long; stem simple or slightly branched; leaves to 25 cm. long, densely lepidote, blades spreading, involute-subulate, filiform-acuminate; scape erect, slender; lower scape-bracts foliaceous; inflorescence lanceolate, acute, terete, 7 cm. long, 8 mm. thick, dense; floral bracts lance-elliptic, 3 cm. long, very thin,



roseate, glabrous or lepidote; sepals acute, 2 cm. long; petals to 46 mm. long, yellow; stamens exserted.

**Tillandsia Seleriana** Mez in Loesener, Bull. Herb. Boiss. II. 3: 84. 1903.

Epiphytic in damp forest or in dry pine and oak woods, 270–1800 meters; Alta Verapaz; Jalapa; Escuintla; Chimaltenango; Quiché; Huehuetenango. Southern Mexico.

Plant 20–25 cm. high; leaves usually equaling or exceeding the inflorescence, coarsely spreading-lepidote, sheaths merging into the blades, forming an ovoid pseudobulb 7–12 cm. long, blades contorted, 1 cm. thick; scape erect, short; scape-bracts foliaceous with blades exceeding the inflorescence, imbricate; inflorescence digitate or nearly so from 3–7 spikes; primary bracts broad, slightly shorter than the spikes; spikes sessile, broadly elliptic, strongly complanate, densely 6–17-flowered, 4 cm. long; floral bracts elliptic, acute, 20–28 mm. long, exceeding the sepals; sepals elliptic-oblong, glabrous, the posterior ones connate for 6 mm.; petals 35 mm. long, violet; stamens exserted.

**Tillandsia Standleyi** L. B. Smith, Contr. Gray Herb. 95: 46, pl. 9, f. 1–4. 1931. Figure 117.

Epiphytic in swamps or along streams or in oak and pine forests, 1450–1500 meters; Alta Verapaz; Zacapa. Honduras.

Plant 1 meter long when extended; leaves erect, rosulate, 4 dm. long, minutely appressed-lepidote, sheaths elliptic, 1 dm. long, dark purple with small pale spots, blades narrowly triangular, 15 mm. wide, pale; scape decurved, shorter than the leaves, covered by its foliaceous bracts; inflorescence bipinnate; axis slender, slightly flexuous, glabrous; primary bracts spreading, lanceolate, acuminate, 26 cm. long, enfolding the spikes, bright red; spikes stipitate, lanceolate, 6 cm. long, compressed, dense, pale green; floral bracts narrowly lanceolate, acuminate, to 35 mm. long, equaling the sepals, glabrous; sepals free, acuminate, carinate; petals nearly 5 cm. long, tubular-erect; stamens exserted.

**Tillandsia streptophylla** Scheidw. in Morren, Hortic. Belge 3: 252. 1836.

Epiphytic, margin of prairie or savanna, sea level to 100 meters; Alta Verapaz; Izabal. Jamaica; Vera Cruz; Yucatan; British Honduras; Honduras.

Plants to 45 cm. high; leaves many, rosulate, 5 dm. long, covered with coarse spreading cinereous scales, sheaths ample, to 1 dm. long, blades narrowly triangular, the outer ones recurving and supporting the plant; scape erect; scape bracts foliaceous, densely imbricate; inflorescence pinnate, 3 dm. long; primary bracts large but their sheaths shorter than the spikes; spikes more or less spreading, bracteate at base, linear, complanate, 8–23 cm. long; floral bracts loosely imbricate, green, 2–3 cm. long; sepals lance-elliptic, 20–25 mm. long, glabrous; petals 4 cm. long, purple; stamens exserted.

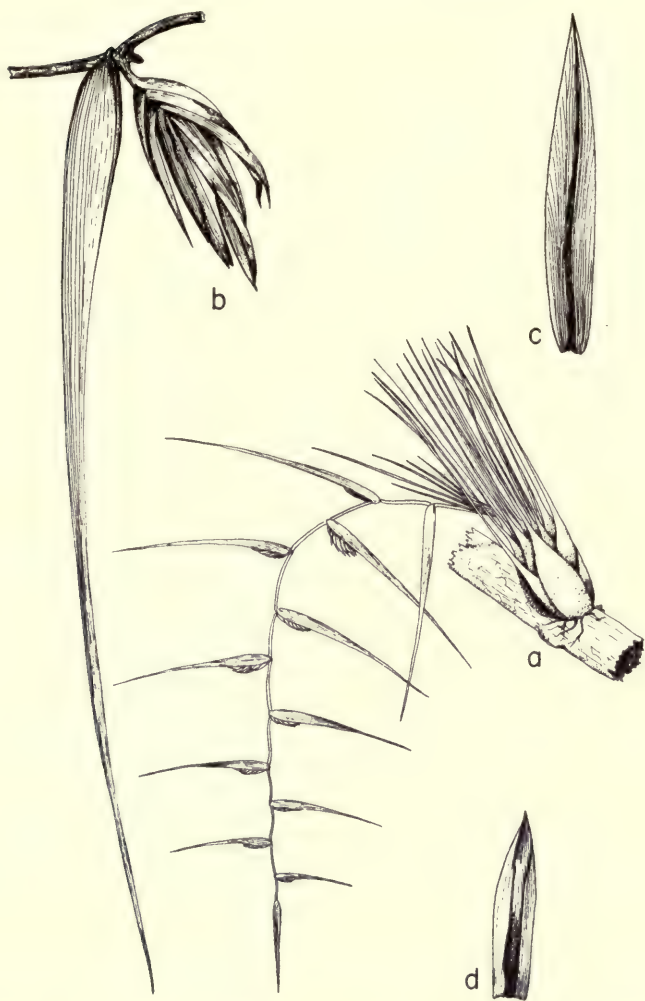


FIG. 117. *Tillandsia Standleyi*. a, Habit ( $\times \frac{1}{10}$ ). b, Bract with spike ( $\times \frac{1}{2}$ ). c, Basal floral bract ( $\times 1$ ). d, Sepal ( $\times 1$ ).

Known in Yucatan by various Maya names: "zholomxal," "xoloblenal," "hkolomxal," and "mulix" (Standley).

***Tillandsia tenuifolia*** L. Sp. Pl. ed. 2. 410. 1762. *Renealmia recurvata*  $\beta$ . L. Sp. Pl. 287. 1753. *R. disticha* L. Syst. Nat. ed. 10. 974. 1759, not *Tillandsia disticha* HBK. 1816. *T. setacea* Sw. Fl. Ind. Occ. 593. 1797. *T. remota* Wittm. Bot. Jahrb. 14: Beibl. 32: 6. 1891.

Epiphytic in forests and dry thickets, 100–1000 meters; Escuintla; Suchitepéquez; Retalhuleu. South Carolina to Florida; Greater Antilles; Mexico; El Salvador; Venezuela; Brazil.

Leaves 2–5 dm. long, usually much exceeding the inflorescence, densely and finely appressed-lepidote, sheaths triangular-ovate, about 8 mm. wide, ferruginous, blades usually less than 1 mm. thick for most of their length; scape erect or ascending, very slender; scape-bracts imbricate, filiform-laminate; inflorescence compound or frequently simple and distichous-flowered, to 12 cm. long; primary bracts like the upper scape-bracts, the sheaths shorter than the axillary spikes but the blades usually much exceeding them; spikes subsessile, turned edgewise to the axis of the inflorescence, lance-linear, acute, 2–5 cm. long, complanate; floral bracts broadly ovate, acute, 8–14 mm. long, exceeding the sepals; sepals elliptic-oblong, acute, glabrous, connate posteriorly; petals 2 cm. long, violet; stamens exserted.

*Tillandsia tricolor* Schlecht. & Cham. Linnaea 6: 54. 1831. *Vriesia xiphostachys* Hook. Bot. Mag. pl. 5287. 1861. *Platystachys complanata* E. Morr. Belg. Hortic. 22: 300, pl. 23. 1872. *Pie de gallo de montaña* (Quezaltenango); *Pie de gallo de palo* (Quezaltenango).

Epiphytic, 1400–2300 meters; Quezaltenango; San Marcos. Southern Mexico; Nicaragua; Costa Rica.

Plant 30–45 cm. high, often propagating by scaly branching rhizomes, leaves many in a dense rosette, minutely appressed-lepidote, the outer ones recurving, sheaths large, deep castaneous, blades linear-triangular, 1 cm. wide; scape erect, slender; scape-bracts imbricate, the lower foliaceous, the upper elliptic, acuminate, red; inflorescence simple or digitate; primary bracts small; spikes linear-lanceolate, acute, cuneate, strongly complanate, flat, 6–18 cm. long, 18–25 mm. wide; floral bracts very densely imbricate, ovate, acute, 2–3 cm. long, much exceeding the sepals, carinate, coriaceous, even, glabrous; sepals lanceolate, acute, the posterior ones high-connate; petals to 7 cm. long, violet; stamens exserted.

*Tillandsia tricolor* var. *melanocrater* (L. B. Smith) L. B. Smith, Jour. Wash. Acad. 43: 68. 1953. *T. melanocrater* L. B. Smith, Contr. Gray Herb. 117: 31. 1937. *T. melanopus* E. Morr. ex Mez, DC. Monogr. Phan. 9: 680. 1896, in large part, not as to type.

Epiphytic in wet forests or swamps, 900–1300 meters; Alta Verapaz; Suchitepéquez; San Marcos. Costa Rica; Panama.

Plant to 3 dm. high; leaf-blades 8 mm. wide, flat; scape erect, slender, usually shorter than the leaves; inflorescence simple or digitate; spikes linear-oblong to broadly elliptic, 4–9 cm. long, 12–20 mm. wide; floral bracts imbricate, ovate, 20–25 mm. long, exceeding the sepals, carinate, coriaceous, even, glabrous or nearly so; sepals lanceolate, the posterior ones high-connate; petals 30–35 mm. long, violet; stamens exserted.

Costa Rican material of variety *melanocrater* differs from typical *Tillandsia tricolor* from Mexico in several minor characters such as



size and number of spikes, number of flowers in a spike, and relative length of scape, so that until now it has readily passed as a distinct species. However, none of these characters is constant, and in Guatemala the two types meet and merge completely.

***Tillandsia tricolor* var. *picta* L. B. Smith, Contr. Gray Herb. 154: 38. 1945.**

Epiphytic, 1200 meters; Alta Verapaz (type from along Río Polochic above Tamahú, *Standley 92046*). Zacapa.

Leaf-sheaths pale-maculate.



FIG. 118. *Tillandsia usneoides*. *a*, Portion of flower, showing petals, pistil, and three stamens ( $\times 4$ ). *b*, Flower on part of leafy branch ( $\times 2$ ). *c*, Portion of stem with leaves and flower ( $\times \frac{1}{2}$ ).

***Tillandsia usneoides* L. Sp. Pl. ed. 2. 411. 1762. *Renealmia usneoides* L. Sp. Pl. 287. 1753. *Dendropogon usneoides* Raf. Fl. Tellur. 4: 25. 1838. *Strepsia usneoides* Steud. Nomencl. Bot. ed. 2. 2: 645. 1841. *Musgo* (Escuintla, Chimaltenango); *Tzin-i* (Huehuetenango). Figure 118.**

Hanging from trees, often in dense masses, 50-1650 meters; Petén; Alta Verapaz; Baja Verapaz; Santa Rosa; Escuintla; Guatemala; Chimaltenango; Retalhuleu; Quiché; Huehuetenango; Totonicapán; San Marcos. Virginia to Texas along the coast and south to central Argentina and Chile.

Plant forming slender branching strands up to 8 meters long; roots usually lacking; stem less than 1 mm. thick, sympodial; internodes 3-6 cm. long with only the extreme base covered by leaves, curved, leaves 5 cm. long, densely lepidote, blades filiform; scape absent; inflorescence 1-flowered; floral bract short, ovate, lepidote; sepals acute, 7 mm. long, thin, glabrous; petals narrow, 9-11 mm. long, pale green or blue; stamens deeply included, exceeding the pistil.

According to Standley the plant is called "paxte," "musgo de pino," "paste," "umeex nohoch uinic" (Petén, Maya, fide Lundell), "musgo blanco." The name "paxte" or "paxtle" is derived from the Nahuatl or Aztec name, "pachtli." It is said that the plant was used by the Aztecs for decorating their temples. It is used commonly in Guatemala for decorations on altars and in house interiors, and for making the *arcos* or slender arches erected over streets and roads on holiday occasions. Streamers of this plant, together with the bright yellow fruits of *Solanum mammosum*, are worn around the corners of their hats by men returning in January from the pilgrimage to Esquipulas, a custom which is believed to descend from an old Indian fertility rite celebrated at the same season of the year. The Spanish moss is abundant in many parts of Guatemala, especially on trees shrouded in fog part of the day. It grows on pine, cypress (*Cupressus*), and other trees. The dried plants are used for filling mattresses and cushions, upholstery, etc. It is reported that they are exported from Alta Verapaz to the United States or Europe, presumably for making mattresses, since some of the most expensive mattresses sold in the United States are made from *Tillandsia* fiber.

***Tillandsia utriculata* L. Sp. Pl. 286. 1753.**

Epiphytic, sea level to 50 meters; Petén (Laguna Petexbatúm, south of Sayaxché, *Steyermark* 46248). Georgia; Florida; West Indies; Tamaulipas; British Honduras; Venezuela.

Up to 2 meters high; leaves 4–10 dm. long, obscurely lepidote, blades narrowly triangular, 2–7 cm. wide; scape erect, elongate; lower scape-bracts subfoliaceous and imbricate; inflorescence laxly paniculate as a rule, glabrous; primary bracts shorter than the elongate sterile bases of the branches; floral bracts remote, erect, obtuse, ecarinate, much shorter than the sepals; pedicels to 5 mm. long; sepals narrow, obtuse; petals white, 3–4 cm. long; stamens exserted.

***Tillandsia Valenzuelana* A. Rich. in Sagra, Hist. Cuba 11: 267. 1850. *T. subluxa* Baker, Jour. Bot. 25: 280. 1887.**

Epiphytic in forest, 100–900 meters; Petén; Alta Verapaz; Suchitpéquez. Southern Florida; Greater Antilles; southern Mexico to Venezuela and Bolivia.

Leaves rosulate, 4 dm. long, minutely appressed-lepidote, sheaths colored like the blades, large, blades narrowly triangular, 10–25 mm. wide; scape erect, slender; scape-bracts imbricate, inflated, pink or red; inflorescence simple or scantily bipinnate; sheaths of the primary bracts shorter than the spikes; spikes oblong, complanate, 5–20 cm. long; floral bracts laxly imbricate, elliptic-oblong, 2 cm. long, much exceeding the sepals, pink or red, thin, nerved; posterior sepals connate; petals 3 cm. long, lilac or violet; stamens exserted.

**Tillandsia vicentina** Standley, Jour. Wash. Acad. 13: 364. 1923.  
*Gallita* (Jalapa).

Saxicolous, epiphytic in wet forest or in dry pine and oak woods, 1500–2700 meters; Baja Verapaz; Zacapa; Jalapa; Guatemala; Sacatepéquez; Chimaltenango; Quiché; Quezaltenango; San Marcos. El Salvador.

Plant to 5 dm. high; leaves many, densely rosulate, about equaling the inflorescence, sheaths ovate, 15–20 mm. wide, dark brown, blades narrowly triangular, 6–8 mm. wide, green above with fine appressed scales, cinereous beneath with coarse spreading scales; scape erect, 4 mm. thick, lepidote; scape-bracts imbricate, filiform-laminate, lepidote; inflorescence digitate or nearly so from 5–14 spikes; primary bracts like the scape-bracts, their sheaths about a third as long as the spikes; spikes lance-oblong, acute, 6–8-flowered, bracteate at base, 4–7 cm. long, strongly complanate; floral bracts imbricate, ovate, acute, 20–25 mm. long, exceeding the sepals, carinate, subchartaceous; sepals lanceolate, acute; petals 4–5 cm. long, violet; stamens exserted.

**Tillandsia Yunckeri** L. B. Smith in Yuncker, Field Mus. Bot. 17: 322, *pl.* 10. 1938.

Epiphytic in dense wet forest, 900–2200 meters; Suchitepéquez; Quezaltenango; San Marcos. Honduras.

Plant about 5 dm. high; leaves many, in a crateriform rosette, straight, 4 dm. long, sheaths broadly elliptic, about 15 cm. long, densely punctulate-lepidote, blades ligulate, acute, 5 cm. wide, flat; scape erect, stout, glabrous; scape-bracts densely imbricate, foliaceous; inflorescence bipinnate, slenderly pyramidal, 2 dm. long, the apical half dense; primary bracts suborbicular with a short foliaceous blade, exceeding and closely enfolding the spikes, bright red, glabrous, lustrous; spikes sessile, broadly lanceolate, acute, densely 4-flowered, 65 mm. long, 25 mm. wide, complanate; floral bracts lance-ovate, acute, 45 mm. long, exceeding the sepals, carinate, coriaceous, glabrous; sepals lanceolate, acuminate, 3 cm. long, carinate, the posterior ones much connate; petals tubular-erect, 5–6 cm. long.

### VRIESIA Lindl.

Large showy mostly epiphytic herbs; leaves densely rosulate, often banded or mottled, entire; inflorescence simple or compound, with usually distichous-flowered spikes; floral bracts usually conspicuous, enfolding the bases of the flowers; flowers subsessile or pedicellate; sepals free; petals free or short-connate, bearing one or two scales each; stamens included or exserted; ovary nearly or quite superior; style elongate; seeds fusiform with a long straight basal coma.

Nearly 200 species from southern Mexico and the West Indies to northern Argentina, with very heavy concentrations in Costa Rica and eastern Brazil.



Inflorescence compound.

Branches elongate..... *V. Werckleana*

Branches reduced to 2-3-flowered fascicles..... *V. montana*

Inflorescence simple.

Floral bracts finely rugose when dry, not secund.

Floral bracts coriaceous, 45-55 mm. long, 3-4 times as long as the internodes.

*V. gladioliflora*

Floral bracts thin, 35 mm. long, 6-8 times as long as the internodes.

*V. pycnantha*

Floral bracts even or nerved, but never rugose.

Flowers becoming secund at anthesis.

Leaf-blades transversely brown-banded..... *V. Schippii*

Leaf-blades concolorous.

Leaf-blades not more than 7 mm. wide; inflorescence 3-flowered, lax.

*V. graminifolia*

Leaf-blades over 3 cm. wide; inflorescence densely many-flowered.

*V. pectinata*

Flowers not becoming secund; sepals lanceolate, acuminate... *V. heliconioides*

***Vriesia gladioliflora*** (Wendl.) Ant. Wiener Ill. Gart. 5: 97. 1880.  
*Tillandsia gladioliflora* Wendl. Hamb. Gartenz. 19: 31. 1863.

Terrestrial and epiphytic in jungle; sea level to 300 meters; Petén; Alta Verapaz; Izabal. Mexico; British Honduras; Costa Rica; Panama; Colombia.

Plant up to 1 meter high; leaves 6 dm. long, blades ligulate, apiculate, 6-8 cm. wide, concolorous; scape erect, stout; scape-bracts imbricate, elliptic; inflorescence many-flowered, 2-4 dm. long; floral bracts imbricate, broadly ovate, obtuse, 45-55 mm. long, equaling or exceeding the sepals; pedicels very short, stout; sepals broadly elliptic, obtuse; petals 4-7 cm. long, greenish white, bearing 2 subincised scales at base; stamens included.

***Vriesia graminifolia*** Mez & Wercklé, Bull. Herb. Boiss. II. 4: 868. 1904.

Epiphytic, 1200-1300 meters; Izabal (uppermost ridges and their summits, *Steyermark 41976*). Costa Rica.

Barely 4 dm. high, very slender; leaves 4 dm. long, sheaths violet or brown, blades linear, acuminate, 5-7 mm. wide, appressed-pale-lepidote, green; scape erect, very slender; scape bracts exposing much of the scape, very narrow, with foliaceous blades, reddish; inflorescence 7 cm. long; axis slender, angled, undulate; floral bracts secund with the flowers and enfolding their bases on one side, membranaceous, striate, the lowest with a long acuminate blade, the others acute and about equaling the sepals; flowers suberect; pedicels 5 mm. long; sepals elliptic, narrowly obtuse, 15 mm. long, castaneous with a pale membranaceous border when dry, even, lustrous; petals and stamens unknown; capsule 28 mm. long, acuminate.

I have not seen the type but the Guatemalan specimen accords very closely with the original description.

**Vriesia heliconioides** (HBK.) Hook. in Walp. Ann. Bot. 3: 623. 1852. *Tillandsia heliconioides* HBK. Nov. Gen. & Sp. 1: 293. 1816. *T. disticha* Willd. ex Schult. in R. & S. Syst. Veg. 7: 1226. 1830, as synonym, not *Renealmia disticha* L. 1759. *Vriesia disticha* Kuntze, Rev. Gen. 3: 304. 1898, as to material cited, not as to basionym. Figure 119.



FIG. 119. *Vriesia heliconioides*. a, Habit ( $\times \frac{1}{3}$ ). b, Flower ( $\times \frac{2}{3}$ ). c, Portion of petal showing two scales at base ( $\times 2$ ).

Epiphytic in jungle, 20–350 meters; Petén; Alta Verapaz; Izabal. Central America; Colombia to Bolivia and southwestern Brazil.

Usually not over 4 dm. high; leaves 2 dm. long, blades ligulate, acute or acuminate, 15–30 mm. wide, subglabrous; scape erect, short; scape-bracts imbricate, broadly ovate; inflorescence oblong, dense, strongly complanate, 20 cm. long, 6 cm. wide; floral bracts broadly ovate, 45 mm. long, sharply carinate with a sigmoid

outline, red toward apex, chartaceous; sepals 27 mm. long; petals white, 6 cm. long, each bearing 2 obtuse entire scales at base; stamens included.

**Vriesia montana** (L. B. Smith) Sm. & Pitt. Jour. Wash. Acad. 43: 69. 1953. *Thecophyllum montanum* L. B. Smith in Yuncker, Field Mus. Bot. 17: 319. 1938. Figure 120.

Epiphytic in forest, 1850–2000 meters; Chiquimula (summit of El Jutal, on Cerro Brujo, southeast of Concepción de las Minas, *Steyermark* 30988). Honduras.

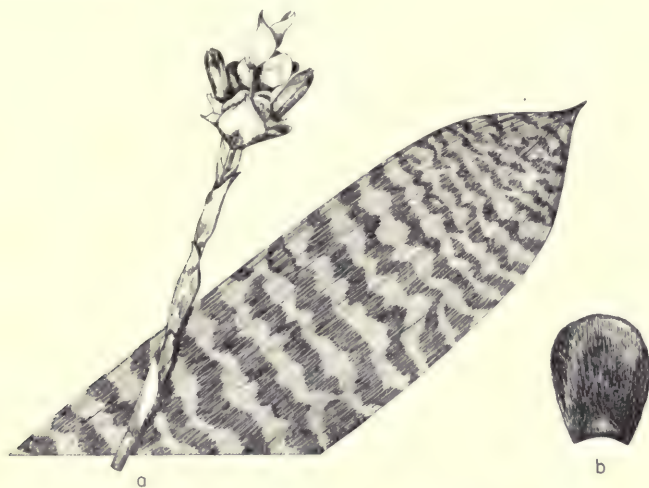


FIG. 120. *Vriesia montana*. a, Scape and inflorescence ( $\times \frac{1}{3}$ ) with apex of leaf ( $\times \frac{2}{3}$ ). b, Sepal ( $\times 1\frac{1}{3}$ ).

Stemless, 4–5 dm. high; leaves in a crateriform rosette, 25 cm. long, transversely marked with broad purple wavy bands, sheaths elliptic, blades ligulate, acute, 3–4 cm. wide; scape erect, 5 mm. thick, glabrous; scape-bracts barely imbricate, broadly elliptic with a short triangular blade; inflorescence few-flowered, subdense, 5 cm. long; primary bracts elliptic, acuminate, about equaling the flowers, remote and not imbricate, bearing 2 collateral flowers in each axil or the lowest with 3; floral bracts suborbicular, 6–9 mm. long, much exceeded by the sepals, broadly convex, ecarinate, coriaceous, even; flowers subsessile or on short stout pedicels; sepals broadly elliptic, obtuse, 12–15 mm. long, coriaceous, glabrous and smooth outside.

Depauperate specimens with only 2 flowers in the lower axils are distinguished by their broadly cross-barred leaves and suborbicular coriaceous floral bracts.



**Vriesia pectinata** L. B. Smith, *Lilloa* 6: 387, *pl. 1, f. 10-13*. 1941. Figure 121.

Terrestrial in wet thicket or forest, 1300–2000 meters; endemic; Alta Verapaz (type from near Cobán, *Standley 69055*); El Progreso.

Plant 1–2.4 meters high; leaves 5–7 dm. long, blades ligulate, acuminate, 3–4 cm. wide, concolorous, sparsely brown-punctulate on both sides; scape erect, 8–12 mm. thick, glabrous; upper scape-bracts shorter than the internodes, broadly ovate, acute, tightly enfolding the scape, brown-punctulate, even; inflorescence densely many-flowered, 6–7 dm. long; rhachis flexuous, subangulate, glabrous; floral bracts secund with the flowers, broadly ovate, acute, minutely cucullate, 32 mm. long, more than twice as long as the internodes, obtusely carinate, coriaceous, faintly nerved when dry, green, brown-punctulate; flowers spreading; pedicels stout, about 1 cm. long; sepals broadly elliptic, acute, 20–25 mm. long, ecarinate, coriaceous; petals narrowly elliptic, obtuse or emarginate, 28 mm. long, yellow-green when dry, bearing two large acute scales at base; stamens included, filaments slightly thickened toward apex.

**Vriesia pycnantha** L. B. Smith, *Contr. Gray Herb.* 154: 38, *pl. 4, f. 10-12*. 1945. *Pie de gallo*.

Epiphytic in low woods of barranco; 1200–1300 meters; endemic; Quezaltenango (type from along Río Samalá between Santa María de Jesús and Calahuaché, *Steyermark 33902*).

Plant 7–8 dm. high; leaves in a cyathiform rosette, nearly 6 dm. long, sheaths elliptic, over 10 cm. long, green except for the dark castaneous base, sparsely and minutely brown-lepidote, blades ligulate, acute and apiculate, 3–4 cm. wide, flat, green, glabrous above, minutely and obscurely lepidote beneath; scape erect, 1 cm. thick; scape-bracts erect, imbricate, foliaceous or subfoliaceous; inflorescence very dense, oblong-elliptic, complanate, 8–14 cm. long; rhachis straight, sulcate, its internodes not over 6 mm. long; only the immature floral bracts known, very broadly ovate, subacute and apiculate, 35 mm. long, slightly carinate toward apex, sparsely brown-lepidote, pale green; flowers not at all secund; pedicels 3–4 mm. long, strongly angled; sepals broadly oblong-elliptic, slightly asymmetric, truncate or slightly retuse, 18 mm. long, subcoriaceous, glabrous, castaneous; capsule slenderly ellipsoid, 35 mm. long; coma red-brown.

**Vriesia Schippii** L. B. Smith, *Contr. Gray Herb.* 98: 18, *pl. 5, f. 5-6*. 1932.

Epiphytic in mountain forest, 600 meters; British Honduras (type from Stann Creek District, near Middlesex, *Schipp S-82*); probably extending into Guatemala.

About 4 dm. high; leaves 3 dm. long, minutely punctulate-lepidote, sheaths large, elliptic, blades ligulate, acute, about 3 cm. wide; scape erect, slender, glabrous; scape-bracts imbricate, acuminate from an ovate base, inflated, pale brown, glabrous except at apex, nearly even; inflorescence laxly few-flowered; floral bracts

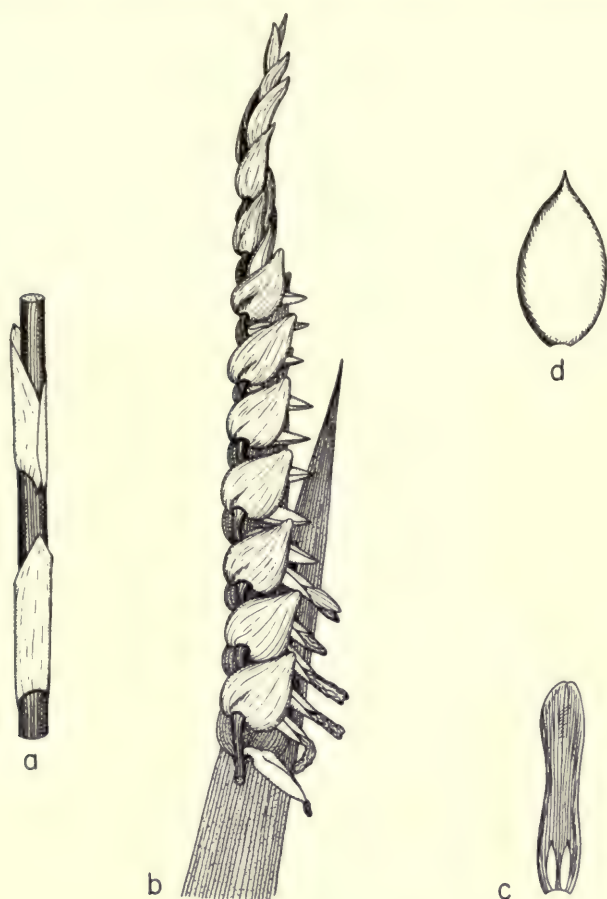


FIG. 121. *Vriesia pectinata*. *a*, Portion of scape ( $\times \frac{1}{2}$ ). *b*, Upper part of inflorescence with apex of leaf ( $\times \frac{1}{2}$ ). *c*, Petal with scales at base ( $\times 1$ ). *d*, Sepal ( $\times 1$ ).

broadly ovate, the lower ones acuminate, to 43 mm. long, ecarinate, secund with the flowers; rhachis slender, flexuous; pedicels 5 mm. long; sepals broadly elliptic, obtuse, 17 mm. long, glabrous, faintly nerved; petals and stamens unknown; capsule slenderly ellipsoid, 3 cm. long.

***Vriesia Werckleana* Mez, Bull. Herb. Boiss. II. 3: 136. 1903.**

Terrestrial and epiphytic in swamps and forests, 1300–2300 meters; Alta Verapaz; Zacapa; Chimaltenango; Quezaltenango. Oaxaca; Costa Rica.

Plant 1–2 meters high; leaves rosulate, 5–10 dm. long, obscurely punctulate-lepidote, sheaths large, ovate-oblong, blades linear-triangular, acuminate, 8 cm. wide; scape erect, 3 cm. thick; scape-bracts densely imbricate, the lower foliaceous, the upper broadly ovate, acute, subinflated; inflorescence bipinnate from 4 to many branches, 7–10 dm. long; primary bracts like the upper scape-bracts, short; branches erect or ascending, dense, 4–6 dm. long; floral bracts erect, more or less secund with the flowers, broadly ovate to suborbicular, inflated, obtusely carinate toward apex, 3 cm. long, about equaling the sepals, thick, coriaceous, glabrous outside; pedicels stout; sepals elliptic, obtuse, 22 mm. long, 12 mm. wide, coriaceous, ecarinate; petals 25–30 mm. long, green, bearing 2 large lanceolate acuminate scales near base; stamens included; capsule stout, acute, beaked, 35 mm. long.



## INDEX

- Abies, 36  
 Abildgaardia, 92  
 Acrocomia, 200  
 Aechmea, 381  
 Alismataceae, 75  
 Ananas, 387  
 Androlepis, 389  
 Anthurium, 306  
 Araceae, 304  
 Araucaria, 25  
 Araucariaceae, 23  
 Asterogyne, 204  
 Astrocaryum, 206  
  
 Bactris, 208  
 Billbergia, 391  
 Brahea, 213  
 Bromelia, 392  
 Bromeliaceae, 380  
 Bulbostylis, 92  
 Butomaceae, 80  
  
 Caladium, 322  
 Calyptrocarya, 98  
 Calyptrogyne, 214  
 Carex, 100  
 Carludovica, 300  
 Caryota, 215  
 Catopsis, 395  
 Ceratozamia, 12  
 Chamaedorea, 217  
 Cladium, 112  
 Cocos, 253  
 Colocasia, 323  
 Cryosophila, 255  
 Cryptomeria, 57  
 Cunninghamia, 57  
 Cupressaceae, 26  
 Cupressus, 27  
 Cycadaceae, 11  
 Cycas, 14  
 Cyclanthaceae, 299  
 Cyclanthus, 302  
 Cyperaceae, 90  
 Cyperus, 113  
  
 Dasystachys, 253  
 Desmoncus, 258  
 Dichromena, 141  
 Dieffenbachia, 324  
 Dioon, 15  
 Diplanthera, 69  
  
 Echinodorus, 75  
 Eleocharis, 143  
 Elodea, 84  
 Ephedra, 63  
 Eriocaulaceae, 374  
 Eriocaulon, 374  
 Erythea, 263  
 Euterpe, 264  
  
 Fimbristylis, 155  
 Fuirena, 160  
  
 Geonoma, 266  
 Greigia, 409  
 Guzmania, 411  
  
 Hechtia, 413  
 Hemicarpha, 162  
 Hohenbergia, 415  
 Hydrocharitaceae, 84  
 Hydrocleis, 82  
 Hypolytrum, 163  
  
 Juniperus, 32  
  
 Kyllinga, 163  
  
 Larix, 36  
 Lemna, 364  
 Lemnaceae, 364  
 Limnobium, 85  
 Limnocharis, 84  
 Lindmania, 417  
 Lipocarpha, 166  
 Lophotocarpus, 79  
  
 Manicaria, 271  
 Mayaca, 369  
 Mayacaceae, 369  
 Monstera, 328  
 Montrichardia, 335  
  
 Najadaceae, 73  
 Najas, 74  
  
 Opsiandra, 273  
 Orbignya, 274  
  
 Paepalanthus, 377  
 Palmae, 196  
 Pandanaceae, 67  
 Pandanus, 68

Paurotis, 277  
 Philodendron, 337  
 Phoenix, 279  
 Pinaceae, 36  
 Pinus, 40  
 Pistia, 347  
 Pitcairnia, 417  
 Podocarpaceae, 20  
 Podocarpus, 21  
 Potamogeton, 70  
 Potamogetonaceae, 68

Reinhardtia, 280  
 Rhapis, 283  
 Rhodospatha, 349  
 Rhynchospora, 168  
 Roystonea, 284  
 Ruppia, 73

Sabal, 285  
 Sagittaria, 79  
 Scheelea, 289  
 Schippia, 293  
 Sciaphila, 88  
 Scirpus, 179  
 Scleria, 183  
 Soridium, 89  
 Spathiphyllum, 350  
 Spirodela, 366  
 Stachyophorbe, 253  
 Stenospermation, 353  
 Synechanthus, 294

Syngonanthus, 378  
 Syngonium, 354

Taxaceae, 60  
 Taxodiaceae, 56  
 Taxodium, 58  
 Taxus, 61  
 Thalassia, 85  
 Thrinax, 295  
 Thuja, 35  
 Tillandsia, 429  
 Tonina, 380  
 Triuridaceae, 86  
 Triuris, 90  
 Typha, 63  
 Typhaceae, 63

Uncinia, 194  
 Urospatha, 357

Vallisneria, 86  
 Vriesia, 470

Washingtonia, 298  
 Wolffia, 368

Xanthosoma, 358  
 Xyridaceae, 370  
 Xyris, 371

Zamia, 15  
 Zannichellia, 69  
 Zantedeschia, 363  
 Zostera, 69





















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